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SEVENTH ANNUAL REPORT

OF THE PRESIDENT OF THE

JOHNS HOPKINS UNIVERSITY

48

Baltimore Maryland

1882

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SEVENTH ANNUAL REPORT

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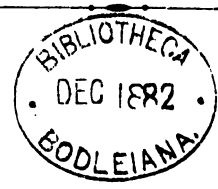
Johns Hopkins University

Baltimore Maryland

1882



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1882

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SEVENTH ANNUAL REPORT.

To the Trustees of the Johns Hopkins University:

You requested me by a formal resolution to present in my last report a review of the work done in the various departments of this university since the opening in 1876, but circumstances beyond my control prevented me from complying with this expressed wish. I am now able to make such a summary as will enable you to judge of the results which have been reached during the past six years. This period is too brief to form a complete estimate of the work which is in progress; but it is long enough to show the principles which are here in operation and to indicate their tendency. It may be said of us, using the words of a recent writer in another connection, that the university has passed "out of the stage of prospectus into the stage of existence." It is a living force, attracting the attention of scholars far and wide, drawing students from almost every part of the Union, and visited frequently by observers of educational progress from foreign lands.

We have continually kept in mind that the principal object of this university is to educate

young men, and to certify to their attainments by careful examination and the bestowal of academic honors. In order that they may be well taught, instructors have been chosen who were already renowned, or who gave promise of marked distinction in the departments to which they were devoted. Consequently the academic staff is made up of men whose early training has been very different, and who bring to bear upon our incipient plans the experience of time-honored institutions, European and American. These instructors have been encouraged to continue their own investigations and studies, and the requisite apparatus and books have been liberally provided. They have also had the means of publication; and they have contributed heartily, each in his own way, to the intellectual activity of the other educational institutions of Baltimore, whenever invited to do so.

But they have never lost sight of their chief duty to the university, the guidance, instruction, and inspiration of young men, by example and by lessons; and to this end they have freely employed the laboratory, the lecture, the recitation, the examination, and the private conference, according to the circumstances of each case, so that every youth coming here for his education might be assured of the best aid which we could give him in the development of his mental powers and the formation of his character.

Some of our students have been already trained in good colleges, and come to us for the advanced opportunities which are here provided, and others are of the usual college age seeking to lay solid foundations for their future special pursuits.

I have often called attention to the distinction which we are endeavoring to make between university education and collegiate training, both of which it is here our endeavor to promote. May I be excused for repeating some of the phrases hitherto used upon this subject, so important does it seem to reiterate these views until they are fully understood.

According to acknowledged precedents still rigidly followed in the old world, universities exercise these four distinct functions: they provide advanced instruction in the chief departments of literature and science, and usually, also, in one or more of the so-called learned professions; they encourage investigation and the publication of important researches; they confer degrees; and they establish laboratories and bring together all necessary apparatus such as books, instruments, works of art, and collections in natural history.

Collegiate instruction is properly introductory to university teaching; it is elementary, formal, and disciplinary. It is largely devoted to the training of the intellectual powers and the formation of habits of attention, acquisition, memory, and

judgment, while it stores the mind with the elements of knowledge. A university cannot thrive unless it is based upon a good collegiate system; and it may rightly encourage or establish a college, if needed, as an important department of its activity.

There is a legitimate distinction between the earlier and later phases of a liberal education—the stage of discipline and the stage of guidance, the period of rules, tasks, and control, preceding the period of stimulating and quickening inspiration; but there is no doubt that both methods of training are in some degree appropriate throughout the academic life. There are likewise two kinds of professors—those who are best fitted by their patient and exact habits of intellectual action, by their well-stored memories, and by their logical modes of expression, to drill the classes over which they are placed; and there are others who have a gift for investigation, who are acute in suggesting important questions to be settled, and ingenious in devising the proper methods of solution—who delight to apply the touch-stone of truth to every doctrine, and to carry the light of modern science into every field. Sometimes both sorts of power are found in one individual.

The disciplinary method of a college calls for men of high social, mental, moral, and religious character, for they are to be concerned in molding

the dispositions of young men, and in forming their habits at a critical period of life, when the parent begins to relax his authority and the youth has not learned to govern himself. It requires as professors those who were born to be teachers, who delight to act upon youthful minds, to inspire them with lofty motives, to train them by the best methods, to emancipate them from the slavery of sloth, to set before them noble examples, to cherish their faith. The lessons to be inculcated during a college course include obedience to recognized authority, the performance of appointed tasks, punctuality in meeting all engagements, and attention to physical development. To acquire knowledge, to master the arts of clear reasoning and fit expression, to test the capacity for different kinds of intellectual exertion, to develop a desire to master difficulties, and to form intellectual friendships and associations, are among the ends to be sought in a college life. Such discipline implies but little freedom; but restraints, if wisely adjusted, are found to be as welcome to the scholar as they are to the athlete.

University methods, assuming that the students have already received this earlier discipline, that they are in earnest in the acquisition of knowledge, and that their characters are nearly formed, require less rigid processes of education. Opportunities, advantages, assistance are freely provided, but the

benefit derived from them must depend upon the individual. He may fail of his degree at the end of his course, but his daily deficiencies will not be charged against him. He may forfeit the confidence of his teachers, or even his membership in the university; he may fail to equip himself for his chosen career; but he can not be forced to learn his lesson or be brought under daily examinations. He must meet, as he does in life, the rewards of his own conduct. Nor will he be kept back by the neglect or dullness of his comrades. The fleetest of foot may travel as he will, without being hindered by those who are fettered. If the student have talents, or the rarer gift of genius, he may learn how to cultivate his powers most advantageously. He will find ready introduction to the writings of those who have been leaders of ancient and modern thought; he will have access to new and costly instruments of investigation; he may aspire to the attainment of a lofty ideal, sure of appreciative counsel from those who know the difficulties and the snares of an intellectual life; he may readily become acquainted with the state and tendency of science in every part of the world, and thus may be trained to make his own contributions to the progress of knowledge and the welfare of mankind. Teachers free from the routine of collegiate instruction, may be most serviceable in

the prosecution of scientific research, and most capable of giving aid to those who are already strong enough to walk alone. There is a sense in which it is true that the best of all teachers is the original investigator. His methods are not adapted to beginners. His followers may be few. But if his mind is endowed with rare qualities which have been assiduously cultivated under favorable circumstances, he will exert a powerful influence upon those who are able to follow him; he will incite his fellow teachers to constant activity; he will draw around him other superior minds; he will bring enduring renown to the university of which he is a member.

Our college work, I am glad to say, begins to be well understood and rightly valued by the people of Baltimore. The number of professional men, for example, clergymen, lawyers, and physicians, who know exactly what a good education should be, and who are now entrusting their sons to our training, is so large as to be very gratifying, and to make us, if possible, more eager than ever to maintain such methods and uphold such standards as experience shows to be the best. We appreciate the reasons why a distant college may be attractive to the youth of the city, but it is our aim to give all who come to us certain peculiar advantages, which they cannot find elsewhere. We have not adopted the plan of bringing

students together in dormitories or at a common table, for we have seen that home life, or that which approaches as nearly as possible to home life, has its own counterbalancing advantages, and that the protective and liberalizing influences of a large city may be conducive to the intellectual and moral development, as well as to the social culture of young men engaged in college work.

To undergraduate as well as graduate students Baltimore presents many special attractions. The cost of lodging and board in excellent private families is moderate. Those who are willing to go a mile or more from our buildings, may find dwelling places at low prices, readily accessible by the horse cars. The libraries of Baltimore, the Peabody, the Historical, and the Mercantile, are excellent, and constantly increasing. The Pratt library will soon be added to the number. The classical concerts of the Peabody conservatory of music are sustained every winter by skilful masters, with the aid of a generous fund. Annual courses of public lectures on the Peabody and Hopkins foundations afford an opportunity to hear the best speakers. There are parks and gymnasiums for recreation and exercise. The religious opinions of all are respected, and churches of every denomination are to be found in the city. Washington may be reached by express trains in an hour. The various libraries and

scientific establishments of the national government may readily be visited, and the work of the legislative, judicial, and executive departments of the capital may incidentally be observed.

A careful review of the opportunities in Baltimore for collegiate education was written last spring, and is appended to this report. I wish it might be read by all the parents in this community who may desire to give their sons a liberal education. I wish it might incite more young men in this large city to avail themselves of the great advantages here offered.

The Johns Hopkins University is an unsectarian foundation. Like the city in which it is placed, it includes among its members those whose opinions and beliefs are widely divergent. But it is not an irreligious foundation because it assumes no distinctive name. It inculcates the love of truth, not only in the daily relations of man to man, but in the defence of opinions, in the prosecution of research, and in the formation of mental habits. It insists upon uprightness of conduct in all its members. Yet in accordance with the usages of other well known colleges, which commonly bear denominational names, it lays down no test or creed for the assent of students or professors. The trustees have expressed a desire to see the university pervaded by a spirit of enlightened Christianity; the ethics taught is Christian ethics; the daily religious

service is Christian worship; but it is obviously inexpedient for the university to become identified with any one religious body. The abundance and diversity of churches in this community is such, that while our officers and students are of many denominations, they are able to maintain the relations which their own consciences approve.

The character, aim, and influence of the university foundation must be discovered in the conduct and utterances of those who administer its affairs, and by its results in a course of years.

NUMERICAL STATEMENTS.

During the year now closing, the interior work of the university has been as successful as ever. Classes have been taught in the various branches of higher mathematics, in chemistry and mineralogy, physics, biology, (including physiology and comparative anatomy); in history, political economy, ethics, logic, and psychology; in Greek, Latin, Hebrew, Sanskrit, French, Italian, Spanish, German, Anglo-Saxon and English. Twenty-four young men completing their courses of study, and passing the requisite examinations, have come forward to take their degrees. Good order, devotion to study, and enthusiasm in literary and scientific pursuits, have characterised the older and younger

scholars. A larger number than usual have matriculated, and an abundance of openings have been ready for those who were prepared to begin an active career.

The academic staff included during the year forty-three teachers, seven of whom were non-resident lecturers. In addition to this staff, five professors, not otherwise connected with the university, acted as examiners in particular subjects where their judgment was sought. The number of students enrolled during the year was one hundred and seventy-five, of whom ninety-seven were residents of Maryland, and sixty-eight came here from twenty-one States of the Union, and ten from foreign countries. Among the students were ninety-nine already graduated, coming from fifty-two colleges and universities; there were forty-five matriculates, (or candidates for the degree of bachelor of arts), and there were thirty-one admitted as special students, to pursue courses of study for which they seemed fitted, without reference to possible graduation. The daily attendance upon eighty-three public lectures was one hundred and thirty-seven,—ascertained by the count of the door-keeper. The number registered at the opening of the present academic year is one hundred and ninety-two, of whom one hundred and ten are graduate students.

The following table indicates the enrollment of students in each year since the university was opened in the autumn of 1876:

	Graduates, (incl. Fellows.)	Matriculates.	Non-Matriculates.	Total Enrolled.	Average Attendance at Public Lectures.
1876–77	54	12	23	89	60
1877–78	58	24	22	104	84
1878–79	63	25	35	123	96
1879–80	79	32	48	159	113
1880–81	102	37	37	176	186
1881–82	99	45	31	175	187
*1882–83	110	49	33	192	

*As shown by the preliminary list at the opening of the academic year.

The attendance upon some of the principal courses during the last four years has been as follows:

	1878–79.	1879–80.	1880–81.	1881–82.
Mathematics, ...	38	31	31	33
Physics, ...	32	38	35	42
Chemistry, ...	39	46	40	44
Biology, ...	26	32	25	32
Greek, ...	40	36	31	33
Latin, ...	27	40	40	39
German, ...	55	60	55	47
French, Italian, etc. .	18	39	33	26
English, ...	*	19	29	22
History, etc.	19	33	40	40
Logic, ...	6	16	13	9
Philosophy and Ethics,	6	12	14	22

*Not recorded.

Looking over our register for the last six years, it appears that four hundred and forty-nine individuals have been here enrolled as students, of whom two hundred and fifty-one have come from Maryland, (including two hundred and four from Baltimore), and one hundred and ninety-eight from thirty-five other states and countries. Of this number two hundred and seventy-five persons pursued courses as graduate students and one hundred and seventy-four as collegiate students.

The university has become a sort of national seminary for the training of teachers, over one hundred of those here taught having become professors and instructors in colleges, academies, and schools. But this is not the only calling for which young men are prepared. Seventy-eight are physicians and students of medicine; thirty-one are clergymen and students of theology; twenty-nine are lawyers and students of law; forty-three are engaged in business (as chemists, engineers, electricians, manufacturers, merchants, etc.); and a few have entered the scientific service of the U. S. Government.

From these general remarks let me proceed to speak of each of the principal branches of study, and to exhibit, as far as I am able, the various steps by which we have reached our present position.

MATHEMATICS.

At the beginning of our academic life, Professor Sylvester, of London, accepted an invitation to the chair of mathematics, and he brought to our counsels long experience as a teacher and great renown as a writer and thinker. He was a member of the chief scientific societies of Great Britain and the Continent, and had received many academic honors. Since he came to Baltimore, the Royal Society of London has bestowed upon him its highest scientific distinction, the Copley Medal, and the University of Oxford has honored him with the degree of D. C. L. He has lectured annually to a company of advanced mathematicians, most of whom have been looking forward to professorships; he has established the American Journal of Mathematics; and has written many original memoirs, not only for his own journal, but for other scientific periodicals. He has also encouraged the preparation of valuable papers by several of his pupils.

At his suggestion, Professor Cayley, of the University of Cambridge, was invited to spend some months of the year just closed in Baltimore, and kindly consented to come and lecture alternately with Professor Sylvester to the same advanced students. His residence among us continued from January to June. His instruction during this period was heartily appreciated by the not incon-

siderable number who were capable of following his masterly lectures, and has given a permanent impulse to the studies of the university in the highest walks of mathematical science. The number of students following these two lecturers, was fourteen. Various brief courses on special advanced subjects were given during the same half-year by Messrs. Peirce, Story, and Craig.

Mr. W. E. Story, Ph. D., a Harvard graduate, who continued his studies in Leipsic for several years, was the first associate appointed in mathematics. Mr. Thomas Craig, Ph. D., a graduate of Lafayette College, who was one of the first persons elected to a fellowship among us, has also become an associate, giving up on this account advantageous appointments offered to him elsewhere. More recently, Mr. Fabian Franklin, Ph. D., after having been successively a student, a graduate, a fellow, and an assistant, has been promoted to the rank of associate.

The courses of lectures have varied annually, so that a student resident at the university during a term of three years, more or less, has had an opportunity to apply himself to many different mathematical subjects. Among the courses which have been given are the following:

Determinants and Modern Algebra (1876–79).
Theory of Numbers (1879–82).
Algebraical Geometry, in connection with the Abelian and Theta Functions (1882).
Clebsch-Gordan Invariantive Theory (1882).

Construction and Dissection of a Riemann's Surface (1882).
New Theory of Universal Multiple Algebra (1882).
Quaternions (1877–82).
Elliptic Functions (1878–80; 1881–82).
Higher Plane Curves, Advanced Course (1880–82).
Solid Analytic Geometry (1878–82).
Total Differential Equations (1877–82).
Partial Differential Equations (1880–82).
Calculus of Variations (1879–80; 1881–82).
Spherical Harmonics (1878–80; 1881–82).
Cylindric or Bessel's Functions (1879–80).
General Theory of Functions, including Riemann's Theory (1879–81).
Definite Integrals (1876–77).
Determinants (1880–81).
Modern Algebra (1880–82).
Higher Plane Curves, Elementary Course (1878–82).
Theory of Equations (1876–82).
Differential and Integral Calculus (1876–82).
Conic Sections (1876–82).
Modern Synthetic Geometry (1877–78).
Gauss's *Theoria Motus* (1877–78).
Theoretical Mechanics (1877–82).
Mathematical Theory of Elasticity (1876–78; 1881–82).
Hydrodynamics (1879–81).

Lectures have also been delivered in allied departments on Mathematical Physics, and on Mathematical Logic.

The instructors and more advanced students in mathematics have held monthly meetings under the presidency of Professor Sylvester, assisted by Dr. Story, as a mathematical seminary, which constitutes in fact the mathematical society of the university. During the last three years, papers on the following subjects have been presented and discussed:

CAYLEY, A. Two cases of the quadric transformation between two planes; a problem of analytical geometry; a geometrical representation of an equation between two variables; associative imaginaries; formulæ of trigonometry.

CRAIG, T. Proof of Abel's theorem; a geometrical theorem; areas of corresponding surfaces; note on an n-fold potential.

DAVIS, E. W. Binodal quartics.

DURFEE, W. P. Properties of the numerical solutions of $ax^2 - y^2 = -1$.

ELY, G. S. Partitions; note on the determination of the number of the even and of the odd integer roots of an equation.

FRANKLIN, F. A deduction from the properties of a system of three circles; v. Gall's table of groundforms for the octavic; new proof of Euler's development of the infinite product $(1-x)(1-x^2)(1-x^3)\ldots$; notes on Newton's method of approximation, etc.; a class of differential equations; probability of the existence of an error in the result of a certain computation; cubic curves; cubics and systems of conics.

HATHAWAY, A. S. Generalized forms of trigonometrical ratios; general method in congruences and its application to the theory of the divisors of cyclotomic functions of every class; similarity between congruences and equations and its significance; cyclotomic functions, considered with respect to a prime modulus p; modular functions.

MITCHELL, O. H. Completion of Fermat's theorem; binomial congruences; completion of Wilson's theorem, and the number of nth residues; properties of the roots of $x^2 \equiv x \bmod. k$; theorem including Fermat's and Wilson's theorems; binomial congruences (mod. $p, f(x)$); residues of symmetric functions; partitions; determinants of powers.

PEIRCE, C. S. Relative forms of quaternions; proof that there are only three linear associative algebras in which division is an unambiguous process.

PERRY, H. M. Rule of signs in determinants; singular solutions.

PRENTISS, R. W. Problem in maxima and minima; a geometric locus.

STORY, W. E. Generalized form of analytical triangle; volumes and surfaces of n-dimensional spheres; two kinds of k-th totients; notation for totients; system of conchordal conics; analytical proof of some properties of binodal quartics; non-Euclidean trigonometry; outline of Clebsch & Gordan's method of finding the ground forms of a binary quartic.

STRINGHAM, W. I. Vector ratios considered as trigonometric functions of angles; rotation in four-dimensional space.

SYLVESTER, J. J. Triangles in- and ex-scribable to a general cubic curve; resultant of two congruences; prerogative of a ternary denominational system of coinage; multisection of the roots of unity; certain integrable class of differential and finite-difference equations; completion of the author's method of obtaining the groundforms to any binary quantic or system of binary quantics; question in partitions; geometrical proof of a theorem in numbers; geomet-

rical treatment of a theorem in numbers; properties of a split matrix; nonions; mechanical involution.

VAN VELZER, C. A. On a condition that the total differential equation $Pdx + Qdy + Rdz + \ldots + Tdv = 0$ may admit of a single primitive; certain compound determinants.

PHYSICS.

Early in 1875, Mr. H. A. Rowland, then of the Rensselaer Polytechnic School in Troy, whose papers on magnetic distribution and permeability had already attracted the attention of Clerk Maxwell and other physicists, was called to the service of this university and encouraged to go abroad for the purpose of visiting new physical laboratories and of purchasing instruments. He was subsequently chosen professor of physics, and has since lectured annually to advanced students on heat, electricity, and magnetism. He has also been responsible for the guidance of their laboratory work. Professor Rowland has had great facilities for the prosecution of original researches and has justified in this respect the confidence reposed in him. His attention was first directed to a determination of the absolute value of the ohm. He soon afterwards proceeded to a re-determination, by a method of his own, of the mechanical equivalent of heat. The experiment was conducted in part at the cost of the Rumford fund of the American Academy, and the results

were published in the proceedings of that society. The historical study of this subject was communicated to the Institution of Science, Letters and Arts, in Venice, in response to their offer of a prize,—and it received from this society the premium of fifteen hundred lire. Recently, Professor Rowland has been engaged in the analysis of the solar spectrum. He devised an instrument for the ruling of "gratings," which give better results in spectrum analysis than have ever before been reached. The photographs of the spectrum thus obtained are most noteworthy. By making these gratings on concave surfaces, a new and very accurate method of comparing wave lengths has been obtained. The particulars of this advance in physics have been described in a recent number of the Circulars, and more will soon be published in regard to them.

It should here, perhaps, be mentioned that at the request of the State Department, Professor Rowland attended as a delegate the International Congress of Electricians held in Paris, in the summer of 1881, and was made a member of an International Commission on Electric Standards.

To the position of associate in physics, Mr. C. S. Hastings, Ph. D., once of the Sheffield Scientific School, and later, the holder of a Tyndall scholarship, was invited. He has given annually the course in general physics, taking up in lec-

tures and exercises the subjects of mechanics, light, heat, electricity, magnetism, etc. He has had excellent apparatus at command for demonstration in addition to that provided for investigation. Dr. Hastings has also carried forward a long and careful study of the astronomical objective, for the purpose of discovering the theory by which such a lens should be constructed. He has recently made three lenses according to the theory which he had worked out, and they have been pronounced satisfactory in a high degree. Dr. Hastings has also given much attention to astronomical physics, and has had a private observatory in which he has observed celestial phenomena. He has also lectured from time to time on this class of subjects, one such course having been given by request to a select company of astronomers in Washington, at the Smithsonian Institution. These gentlemen subsequently addressed a letter to the trustees, indicating the profit they had derived from his lectures, and especially from that part of them which related to the improvement of the telescope.

In 1879–80, an investigation of an action, hitherto unobserved, of the magnet on electric currents was carried on by Mr. E. H. Hall, then a fellow, at the instance of Professor Rowland.

The physical apparatus is new and good. A very large number of instruments intended for

research have been bought of the makers, and others have been manufactured here by Mr. Schneider, the mechanician of the university, whose skill is deserving of much commendation. Others have been bought for the purpose of illustrating the general course of lectures, and others again for the use of properly qualified students who wish to become familiar with the exact methods of physical inquiry. It is unfortunate that this costly apparatus is not more conveniently arranged, and that better rooms are not provided for the delicate investigations which are in progress. One of our most pressing wants at the present time is a good building for the physical laboratory. Such buildings are not common in this country, but their importance is so obvious that generous individuals have recently given large sums for their construction at Cambridge and New Haven; and within a very short time we may expect to see the colleges in both those places better equipped than we are for the study of physics, unless indeed the trustees of this foundation see the way clear to build such a laboratory in Baltimore.

There seems to be a special demand at this time for trained physicists, and the students of this department have been called to good positions quite as soon as they were ready to go.

CHEMISTRY.

Professor Remsen, then of Williams College, Mass., was invited to the chair of chemistry in 1876, and a laboratory was immediately built under his direction, adapted to the needs of about forty chemists. More than that number of students have recently sought admission at the same time, and the laboratory is consequently being enlarged to a much greater capacity. Dr. Remsen has given the annual course in general chemistry, an annual course in organic chemistry, besides other advanced courses on thermo-chemistry and the history of chemistry. He has, further, directed the practical work of the students.

Ever since the organization of the laboratory, researches in various directions have been carried on constantly, the results of which have appeared in the American Chemical Journal and the principal foreign journals of chemistry. The main line of investigation has followed a group of phenomena observed in oxidizing the substitution-products of the so-called aromatic hydrocarbons. A law of wide application governing these phenomena has been discovered, and other results of value have been obtained. While the substances which have formed the special subjects of the studies are themselves not familiar to laymen, the principle established is applicable to familiar facts, throwing much needed light upon them.

Among many incidental services which have been rendered to the public by our chemists, the most noteworthy has been a study of the drinking waters of Baltimore, which was undertaken at the request of the civil authorities, to ascertain the cause of the so-called *cucumber*-taste, at certain times quite disagreeable. Professor Remsen showed conclusively that many supposed causes of this taste were not real. His investigation allayed much anxiety on the matter, and led to his being invited by the civil authorities of Boston to make a like investigation in and near that city. Here he was so fortunate as to discover that contamination in one of the sources of supply, was due to the presence of a fresh water sponge, *spongilla lacustris*. Under the auspices of the National Board of Health, Professor Remsen has investigated the subjects of "organic matter in the air," and "carbonic oxide as a source of danger in apartments heated by cast-iron stoves and furnaces." He had also begun a complete investigation of the question of water contamination by sponges, but the failure of Congressional appropriations has, at least temporarily, put an end to this work.

The establishment of the American Chemical Journal is referred to on a later page.

The associate, Mr. H. N. Morse, Ph. D., once of Amherst College, has given a part of the lectures, and has had constant oversight of the

laboratory. Recently he has begun to give instruction also in mineralogy, and has been quite successful in building up the cabinet of minerals. George T. Marye, Esq., of San Francisco, is making constant and generous additions to this collection, illustrating the mineral wealth of the Pacific States, and his contributions are to be brought to us across the continent, without charge, by the liberality of Messrs. Wells, Fargo & Co., and the Adams Express Company.

Some of the students of the chemical laboratory have gone into business pursuits; others are engaged as professors and teachers.

BIOLOGY.

As we looked forward to the time when the study of medicine would be especially promoted in this university, in connection with the hospital founded by Johns Hopkins, attention was given in our earliest plans to the study of the biological sciences, in order that young students expecting ultimately to become physicians and surgeons, might receive in the preceding collegiate course, the most suitable training for their useful and difficult calling.

The medical department of the university is not yet organized, but a very considerable number of students have been here taught physiology and morphology, by the methods of modern biological

science, and have gone from among us to professional schools. Many resident physicians have also availed themselves of the opportunities here afforded to become acquainted with the most recent advances in these branches of science.

The head of the biological department is Professor Martin, a graduate of the University of London, and of the University of Cambridge, and he has directed his attention chiefly to the science of physiology. Dr. W. K. Brooks, from the Museum of Comparative Zoölogy, Cambridge, Mass., has been from the beginning an associate in biology, and has given instruction in animal embryology and morphology. There have been other excellent adjuncts in the biological staff, all promoted after prolonged studies among us, namely, Messrs. Sewall, Clarke, Sihler, Councilman, Sedgwick, and Wilson.

The course of studies recommended to students who expect to become physicians, (quite distinct from and antecedent to the strictly professional study of medicine, but quite as essential in these days to the liberal education of a medical man), is made up of physics, chemistry, and biology, with the addition of Latin, mathematics, psychology, and English literature, and with at least sufficient knowledge of German and French for the perusal of scientific works which are written in those languages. It was somewhat of a surprise to us that

the announcement of such a course should at first be received with hesitation by those who were in a position to judge of it, but we were soon informed that this hesitation was due to a lack of acquaintance with the purpose we had in view, and likewise to some quite secondary and perhaps infelicitous phrases which were employed in the original announcements. We were presently confirmed in the course we had adopted by the very encouraging letters received from a number of eminent physicians in Great Britain, several of whom had long been familiar with the professional schools of England, Scotland, and Ireland.' These letters were not in a form for publication, but they contained many valuable comments which were of service to the authorities of the university.

The following statement has been written by Dr. Martin, to show the character of the course in biology recommended to undergraduates:

"Among the subjects which students may take up after studying physics and chemistry, is biology, and this study is recommended to those who are preparing themselves to enter at a later period upon the professional study of medicine.

"When the undergraduate enters the biological laboratory, he does not at once begin the study of botany or zoölogy, or any subdivision of these, but gives attention during the first year to general biology—to acquiring a general knowledge of the forms assumed and the properties exhibited by living matter. For this purpose the student commences with the study of unicellular organisms; is next carried on through a series of types selected from the higher fungi, the cryptogamous, and the flowering plants; and is finally made to examine thoroughly a specimen from each class in the animal kingdom. These types form the texts for lectures and recitations upon general biological laws and the phenomena which they are selected to illustrate; but the main work is done

in the laboratory, so that the instruction has a firm practical basis, and the various technical terms are made intelligible through their illustration by the observations of the student himself. Having formed a good acquaintance with a number of adult forms the student next takes up embryology, the lectures on which are illustrated by a thorough practical study of the development of the chick, and a less extensive one of the developmental histories of some other animals. During this preliminary course the student also, with the aid of a selected series of skeletons, studies the main facts in human and comparative osteology. After its completion some specialization of study is permitted, and the more advanced a student is the more is this encouraged. In the next year, if he intends afterwards to enter a medical school, he takes up the study of animal physiology and histology; and also dissects one of the higher mammalia (dog or cat) with minuteness and care, and attends a short course of lectures on comparative anatomy. Students who do not look forward to becoming practitioners of medicine, may select animal morphology for special study in the second year of the biological course, in preference to animal physiology. Definite arrangements for the prosecution of botanical studies beyond the point to which they are carried in the first year of the biological course, have not yet been made.

"This undergraduate course, while primarily designed as a stepping stone for those who intend to become biologists, is at the same time complete in itself, and believed to be the form of biological instruction best adapted for those who do not expect to become either botanists, zoölogists, or physiologists, but who desire to acquire some knowledge of the methods and ideas of modern biology, as one of the branches of general culture which they select among the studies leading to the baccalaureate degree."

I should be wrong if I gave the impression that the biological work of the university has been only directed to the training of future medical students. It has afforded instruction to several undergraduates of the university who selected biology as one of the subjects in which to stand examination for the B. A. degree, but who had no intention of ever studying medicine; and it has also been concerned in important researches, the results of which have been published in the Journal of Physiology, of which Dr. Michael Foster, of the University of

Cambridge, is the editor, and in Studies from the Johns Hopkins Biological Laboratory, edited by Professor Martin and Dr. Brooks; also in various other scientific periodicals, and in the transactions of learned societies.

As regards post graduate work in physiology the following statement has already been published:

"The relations of the university to the hospital seemed from the first to indicate animal physiology as a subject having special claims on us, and this opinion was confirmed by a consideration of the present status of that science in this country. Notwithstanding a small number of brilliant physiological discoveries made in the United States, and the fact that several distinguished physiological investigators are found here, it can hardly be said that America has taken her fair part in contributing to the modern advance of physiology. The costliness and variety of the accurate instruments required for modern physiological research almost preclude any but a well-endowed institution from obtaining them; hence the majority of medical students, even had they time, have not the opportunity of acquiring that practical knowledge of the methods of physiological inquiry which is so valuable an auxiliary in those therapeutical and pathological researches, which, conducted on the modern experimental method, have added so much in late years to the list of remedial agents at the disposal of the practising physician. Numerous good teachers do, no doubt, give instruction concerning those main facts already acquired which it is essential for the practitioner to know, but it seemed important to introduce a graduate course to train men as specialists in physiology, so that they might not only be qualified to teach it, but to add to our knowledge of the working of the living body, and to supply new facts for the physician to utilize. While chemistry has made good its position as a science which, though essential to those who practice medicine, has claim to a place in the circle of sciences apart from that or any other immediate practical application, physiology has only recently begun to advance into that fortunate position and to be pursued for its own sake, as it now is in many European countries; as yet in the United States it is but little studied, except in immediate connection with a medical curriculum. Manifold experience has, however, showed that a science rarely makes important advances when pursued merely as a means to some specific end to which it is made secondary; and as modern advances in the investigation of the action of drugs and in the comprehension of pathological phenomena are more and more arrived at by reasonings based on physiological results, and by experiments carried on by

physiological methods, the time seems to have arrived when, at least in certain centres, physiology should be made a subject of independent study.

"For the reasons briefly stated above, animal physiology has formed one of the subjects for special advanced study selected by the Johns Hopkins University; and of its subdivisions, more attention is given to what is commonly known as "experimental" than to "chemical" physiology, the latter being already fairly well provided for in several colleges. Of animal histology the same may be said. Therefore, while arrangements were made to enable any student to verify for himself the main points established in animal chemistry and histology, the chief endeavor has been to provide special facilities in the so-called experimental physiology, and the instruments brought together for advanced study and research in that branch of knowledge are believed to be more numerous and to cover a wider ground than those to be found elsewhere in this country. The laboratory is conveniently arranged for advanced work, the rooms occupied by those engaged in it being shut off from the general laboratory fitted up for the junior students.

"As to the method of selecting instruments the following statements may be of interest. Before the opening of the university the trustees placed at the disposal of Professor Martin, to whom was entrusted the organization of the biological department, a considerable sum, which was mainly expended in procuring the instruments and appliances essential for the various branches of undergraduate biological work. For instance, a number of microscopes were purchased, so that each student should have one for his own use; also the apparatus necessary to enable every one to repeat for himself, (as he is required to do when pain to an animal is not involved,) the more easy physiological experiments, and the apparatus necessary for the demonstration of such fundamental physiological facts as are too difficult for the less advanced students to carry out for themselves. Since that time the trustees have yearly provided $1,000 for the purchase of new instruments; of these some are selected from those which have been described within the preceding twelve months and seem of value, or which, though older, are of general usefulness in the laboratory; the remainder are purchased for the execution of special investigations, so that, within reasonable limits as to cost, any one engaged in a research can have purchased or constructed for him such instruments as he may require. The collection of apparatus is, therefore, somewhat unique; starting with the general outfit of a physiological laboratory, and growing by the constant addition of the more frequently useful instruments for demonstration and class-work, it also contains many pieces of apparatus which were ordered for special ends; and both groups are added to yearly.

"A competent mechanic, at work on the premises, constructs some of the new apparatus, and also, which is more important, is always at hand for the immediate repair of any instrument which may get out of order."

With reference to the graduate instruction in zoölogy and comparative anatomy, another extract from the published announcements may here be given.

"The next question for consideration was what should be done to promote graduate study in zoölogy and comparative anatomy. Here again the best principle to adopt seemed to be, after arranging to give the ordinary undergraduate instruction as well as to provide the more essential appliances for advanced work in all branches of zoölogy, to select for special effort and encouragement the subdivision which should appear to be least commonly or efficiently promoted elsewhere.

"Facilities for advanced work in systematic zoölogy were already well provided in many educational institutions and also in connection with the national coast and territorial surveys, and the national and State fish commissions. Of comparative anatomy, so far as adult forms are concerned, almost the same may be said; but, with some well known exceptions, the study of the development of individual animals, considered in connection with problems of general animal morphology, has received less attention, although the American fauna affords many unique opportunities, and it is now generally believed that all scientific systems for the classification of animals and the recognition of homologies in the organs of different species, genera, and classes, must be mainly based on the study of the developmental histories of individuals.

"The university has accordingly not undertaken the formation of any extensive museum; such typical specimens are provided as are requisite for the satisfactory instruction of ordinary students of zoölogy, but there has been no attempt to bring together a vast collection such as specialists in systematic zoölogy require for their work. Such collections are found in several other educational centres, and, therefore, in accordance with the general principles of the university, were not considered as of primary importance here; while the fact that the national collections at Washington are within easy reach of persons residing in Baltimore should any point needing reference to a large museum arise, made it possible for the present to postpone the founding of a museum of natural history. Whether the university will ever undertake this task is a question for future decision. No doubt ready access to an extensive collection is of vast importance to every zoölogist, a museum being to him very much what a great library is to the philologist. We may perhaps hope that what Peabody has done in founding a great reference library in Baltimore, which has freed the university trustees from the necessity of expending their income for that purpose, may some day be supplemented for the biologists through the endowment by some citizen of a natural history museum, the organization of which shall be entrusted to experts, so that,

while a source of recreation and instruction to the general public, it shall also be available for scientific work."

As an aid to the study of morphology, besides the facilities afforded in our biological rooms, a marine station for zoölogical research has been maintained upon the seaboard during the last five years. The only opportunities before provided for thorough study of marine zoölogy upon the thousands of miles of sea coast of the United States have been those afforded by the private laboratory of Mr. Alexander Agassiz at Newport, and that of the United States Fish Commissioners at Wood's Holl, under Professor Baird; and before the opening of the Chesapeake Zoölogical Laboratory, the founding of a marine laboratory for advanced research had not been attempted in this country by any educational institution. The director of the station is Dr. W. K. Brooks, assisted during a part of the time by Mr. S. F. Clarke, Ph. D., now professor of natural history in Williams College, and more recently by Mr. E. B. Wilson, Ph. D. The results of each summer's studies have been or will be printed in full, in the appropriate journals. Three of them are, however, so important as to deserve particular mention here. Dr. Brooks's memoir on the development of *Lucifer* was accepted by the Royal Society of London, and has just been published in a quarto volume of 80 pages, illustrated by

eleven plates. Dr. Wilson's memoir on *Renilla*, an elaborate monograph, likewise illustrated by numerous careful drawings, is now ready to be printed. Dr. Brooks's study of the *Oyster* has attracted very wide attention. He began this investigation from a point of view purely scientific, determined to observe and if possible to discover the laws which govern the reproduction of this mollusk. The results of his enquiry were printed in 1880, and widely distributed. His success was so remarkable that it was honored by a medal from the *Société d'acclimatation* in Paris, and has led to repeated requests that he would continue his investigation and endeavor to discover the causes which are rapidly destroying the oyster beds of the Chesapeake. With the hearty concurrence of the trustees, Dr. Brooks has accepted a place on the oyster commission appointed by the Governor of Maryland, and during the next few months, he will, with his colleagues, make further researches upon a question which is as interesting from an economic as a scientific point of view. Dr. Brooks has also rendered important scientific counsel in respect to the management of an aquarium to be established in Baltimore, by John W. Garrett, Esq., for public entertainment and instruction in natural history.

The rooms devoted to biological work have been from time to time increased, but the accommodations are still so inadequate that the trustees have

begun the construction of a new building to be entirely devoted to this study, and Dr. Martin has just returned from Europe, able to bring into service among us the latest suggestions of kindred institutions abroad. Liberal appropriations for the purchase of apparatus have always been made by the trustees. The collections of specimens are such as are needed by students among us.

Among the noteworthy discoveries which have been made in the biological laboratory may be mentioned that of a new method of studying the physiology of the mammalian heart, devised by Dr. Martin. By this method the heart of a warm blooded animal is kept alive after the death of all the rest of the creature; the direct influence of various conditions and of different drugs upon it can accordingly be studied with an accuracy previously quite unattainable, the influence of the nervous system and of other organs of the body upon the heart being eliminated. Hitherto, only the hearts of cold blooded animals have been available for physiological, pathological, and therapeutical study in this isolated condition; and for obvious reasons deductions as to the functions of the human heart, drawn from the study of the so different hearts of frogs and turtles, were open to many objections. Some first fruits of this inquiry have been communicated to the Medical and Chirurgical Faculty of Maryland, by Professor Martin, and by

his associates and scholars, Messrs. Sewall, Sedgwick, Howell, H. H., and F. Donaldson, and Warfield, and have been printed. Dr. Martin, recognizing the co-operation of his staff of adjuncts, proposed to call this important mode of inquiry the "Baltimore method." To utilise it in the thorough study of cardiac physiology will supply abundant work for many hands for several years, numerous problems which have hitherto been unattacked being now rendered available for investigation.

In addition to the papers published in the biological studies, attention should be called to a manual of human physiology, prepared by Dr. Martin, entitled "The Human Body"; to a hand-book of invertebrate zoölogy, prepared by Dr. Brooks for the scientific student at the sea-shore; and to a manual on the anatomy of one of the chelonia, (the slider-terrapin), by Dr. Martin and Dr. W. A. Moale, being the first part of a hand-book of vertebrate dissection, for use in biological laboratories. A school edition of "The Human Body" is now in type, as is also the second part (how to dissect a bird) of the hand-book of vertebrate dissection.

ANCIENT AND MODERN LANGUAGES.

As a leader in classical philology, Professor Gildersleeve was called here from the University of Virginia, where he had long been the professor of

Greek, and had acted for several years as professor of Latin. He declined to be responsible for the instruction in Latin, and concentrated his force upon Greek, with the purpose of giving to students, who propose to become teachers, and others, an opportunity to pursue their studies beyond the ordinary classical curriculum. At an early day he found it convenient to employ some of the methods which are used in the seminaries of German universities, and engage with his class in the prosecution of special inquiries bearing upon some central theme.

The work of the seminary in successive years has been as follows:

In 1878–79, the exercises included the analysis, exegesis, and criticism of selected tracts of Lucian, and the prosecution of researches into the language of Lucian and the life of the second century, such as Lucian's relation to Herodotus, the Ionism of the *Dea Syria* and the *De Astrologia*, the use of the optative in Lucian, Lucian and Diogenes Laertius, traditions as to the oriental origin of Greek philosophy, the worship of the Syrian Goddess, Lucian's attitude toward religion, and Lucian as a student of art.

In 1879–80, the centre of work was Aristophanes, and the play selected for special study was the *Wasps*. The members of the seminary were required to present in turn an exegetical and critical commentary of a portion of this comedy, and this work constituted a regular weekly exercise. In order to secure a wider knowledge of the author, cursory readings were also instituted in the other plays, which were in like manner assigned to certain students, charged with the duty of preparing the historical introduction and the analysis. In this way nearly all the members were made acquainted with the bulk of Aristophanes, and some of them followed besides a course of study in the fragments of the comic poets. Among the more elaborate papers, which were the fruit of this work in Aristophanes, may be mentioned the following: On the tropology of Aristophanes; on the genitive case in Aristophanes; on the infinitive in Aristophanes; on the distribution of the *choreutai* in the *Wasps*.

In 1880–81, the seminary was mainly engaged in the study of the Attic orators, especial attention being paid to the development of language and style and to the antique canons of æsthetic criticism. The members were required to furnish in turn exegetical and critical commentaries on select portions of the orators, to prepare historical introductions, to make analyses of speeches and abstracts of rhetorical treatises. Parts of Antiphon, Andokides, Lysias, Isokrates, Isaios, and Demosthenes were studied in this way, and some of the minor orations of the four last named were compared with one another in connection with the *iudicia* of Dionysios of Halikarnassos. Besides this general work, subjects of special study in the orators were assigned to individual members of the seminary and an effort was made to insure a personal acquaintance on the part of all the students with the works of all the orators of the Attic canon. Introductory lectures, informal examinations, and conferences were also held by the Director at suitable points in the course. Of the investigations which were carried on may be noted: Studies on the nominal periphrases for the verb in Antiphon and Thukydides; on the genuineness of the first Antiphontean oration; on synonyms in Antiphon; on the use of the locative formations, of *πρίν*, and of *ἐπί* in the orators; an elaborate statistic of certain syntactical characteristics of Andokides; an inquiry into the influence of technical rhetoric on the *ῥήσεις* of the Attic drama. Special work was also done in Isaios, Lykurgos, and Deinarchos.

In 1881–82, the centre of work was Plato, chiefly with reference to the literary form. In the seminary proper, the *Euthydemos* and the *Theaitetos* were interpreted by the members in turn, with analyses and introductions and the *Symposion*, *Republic*, and *Protagoras* were analyzed. Papers were presented, read, and discussed on the *Euthyphron*, on the aim and result of the *Theaitetos*, on Dionysios' criticism of the style of Plato. Studies were made in Platonic syntax and on the relation between the discourses of Socrates in the *Symposion* and in the *Phaidros*. Some work growing out of the studies of the preceding seminary year was completed, such as an exhibit of the use of the so-called genitive absolute in the orators. A study on *ἐπί* in the orators, begun the preceding year, was extended to Homer and Plato, and in continuation of a line of syntactical investigations opened several years since by the director, statistics of the articular infinitive in Xenophon and Plato were prepared by members of the seminary. The results of some of these investigations will be prepared for publication. A survey of Homeric comparisons grew out of the consideration of the comparison in Plato, which was the theme of an earlier seminary essay. Professor Goodwin, of Harvard University, conducted the seminary for one meeting, in order to prepare the members for his presentation of the *Line* and the *Cave* in the *Republic*.

The establishment of the American Journal of Philology, under the editorial care of Professor

Gildersleeve, is mentioned in another place. His four courses of public lectures on Greek lyric poetry, on Homer's Odyssey, on Greek prose literature, and on the Greek tragic poets, were admirably adapted to awaken and keep up the love of classical literature among all who heard him.

The university is co-operating with several other institutions in the encouragement of Americans to engage in archæological investigations at Athens, under the auspices of the American Archæological Institute, Professor Goodwin being the present director.

In order that the classical instruction of undergraduate students might be carried forward in the most efficient way, the services were engaged of Professor Charles D. Morris, a graduate of the University of Oxford, and a former fellow of Oriel. He had already acquired a reputation in this country by his text-books, and by his remarkable success as a teacher. Upon him to a very large extent has devolved the instruction of matriculated students in the Latin and Greek classics. In this work assistance has been rendered in successive years by Mr. John M. Cross, of Baltimore, a graduate of Princeton, who also acted as registrar during our opening year, Mr. G. F. Nicolassen, Ph. D., and Mr. E. H. Spieker, Ph. D. Mr. J. F. Jameson, Ph. D., has been recently engaged to give instruction in classical history and geography.

The authors read in undergraduate classes have been these:

GREEK.		LATIN.	
Aeschylus.	Isocrates.	Catullus.	Persius.
Aristophanes.	Lyric Selections.	Cicero.	Plautus.
Aristotle.	Lysias.	Horace.	Pliny.
Demosthenes.	Plato.	Juvenal.	Quintilian.
Euripides.	Sophocles.	Livy.	Tacitus.
Herodotus.	Thucydides.	Lucretius.	Terence.
Homer.	Xenophon.		

In 1879, the university invited to its staff Mr. Minton Warren, a graduate of Tufts College, who had been resident in Germany for several years pursuing the study of Latin. Before coming to us he received the degree of Ph. D. from the University of Strassburg, having presented as his thesis, a paper on the enclitic *ne* in Early Latin. This appointment enabled the university to offer still further advantages for classical study. Dr. Warren has begun a Latin seminary, which was devoted, during the last winter, to the study of Virgil. The character of this work is indicated by the following paragraph:

A preliminary course of ten lectures was given on the ancient lives of Virgil, on the MSS., commentators, and scholia, and on Virgil's place in Roman literature. Occasional lectures were given during the year on various topics connected with Virgilian criticism. Special attention was paid to the syntax of Virgil and his influence upon subsequent writers, and to the development of the hexameter from Ennius down to Ovid. Some metrical statistics were collected by members of the seminary, and papers were read summing up recent views of Virgil's imitation of Greek poets, on his archaisms, and his value for the illustration of Roman antiquities. All of the Eclogues and Georgics were analyzed by the members in turn, and four of the Eclogues, the Episode of Aristaeus in Book IV of the Georgics, and portions of Books I, VI, and VIII, of the Aeneid were made the subject of critical interpretation.

Mr. C. R. Lanman, Ph. D., a former scholar of Professor Whitney, and subsequently a student of philology in Tübingen and Berlin, came to Baltimore as a fellow in 1876, and was soon promoted to the rank of an associate in Sanskrit. He gave instruction in this language and in comparative philology during three years, and was then called by the authorities of Harvard University to a corresponding professorship in Cambridge. While here, he was engaged in preparing an elaborate study on noun inflection in the Veda, which was printed by the American Oriental Society in a memoir of 276 octavo pages. After he resigned, the vacant position was offered to Mr. M. Bloomfield, Ph. D., who had been a pupil of Toy and Whitney, had resided for one year as a fellow in Baltimore, and had continued his studies in Germany. Dr. Bloomfield began his courses of instruction among us in 1881, and has already made several noteworthy contributions to philological science.

Instruction in the Semitic languages was given from 1876 to 1879 by Mr. Thomas C. Murray, who had prepared himself for this work by his studies under Ewald and Lagarde. After his death, some instruction in Hebrew was given by Mr. J. M. Cross, and at a later day Dr. Bloomfield consented temporarily to take charge of the class.

The instruction in German was given from 1876 to 1882 by Mr. H. C. G. Brandt, who has just resigned his position as an associate, to become, after a year's residence in Europe, professor of modern languages in Hamilton College, where he graduated and began his professional career. Mr. Brandt has not only been an efficient teacher of modern German, but he has encouraged the study of Teutonic philology by teaching Gothic, Old High German, and Middle High German. His resignation occasions much regret. Fortunately, Dr. Wood is able to assume the duties of Mr. Brandt, and consents to do so temporarily, with the promised co-operation of Professor Raddatz and Dr. J. W. Bright. Dr. W. H. Browne, our librarian, will relieve Dr. Wood of a part of his duties in the English department, and Dr. W. H. Carpenter will give a short course of lectures on Icelandic literature. These arrangements will enable the trustees to take a sufficient amount of time to determine upon a permanent appointment.

Mr. A. M. Elliott, a graduate of Harvard College, and a philological student for many years in Munich, has been since 1876 an associate in Romance philology, and has given lectures and conducted seminary exercises in Provençal, Old French, and the related languages and dialects of southern Europe. He was unfortunately prevented by a serious illness from resuming his duties at

the beginning of this term, but his early recovery and return are confidently anticipated. M. Rabillon, well known in Baltimore for his literary acquisitions and culture, has lectured annually in French upon classical authors and upon interesting periods in the literary history of France. The minor courses in French have been given during the past two years by Mr. P. B. Marcou, a graduate of Harvard, to whom both French and English have been from his earliest life familiar tongues. He still continues to be in charge of the introductory classes in French.

The authorities of the university have been desirous of giving special prominence to the study of the English language and literature, and three distinguished scholars of wide reputation have successively been invited to come here as professors. Two of them were Englishmen, who would not consent to cross the ocean, and the third was so strongly attached to his home in Cambridge that he could not be drawn away from it. The one last referred to, Professor Child, consented to lecture here in two successive winters. The impulse which he gave to the study of Early English by his courses on Chaucer and on ballads, and the pleasure derived from his interpretation of Shakespeare, are still gratefully remembered. The chief instruction in English philology has been given by younger men—first by Mr. A. S. Cook, Ph. D., now professor

of English in the University of California, and then by Mr. Henry Wood, Ph. D., still associate in English. Both these gentlemen have prosecuted their studies under able German teachers in Teutonic, and especially in English philology, the last named proceeding to a degree in Leipsic, the other in Jena. In connection with this branch of study, some attention has been given by other teachers to practical exercises in writing English, and to vocal culture by Mr. C. L. Woodworth.

During two years, lectures were given on English literature by Mr. Sidney Lanier, and we were anticipating continued co-operation from him; but the career of this gifted man was closed by death in the summer of 1881. A few of his friends in Baltimore, Boston, Atlanta, and other places, united in presenting to his widow a substantial testimonial of their appreciation of his character and works.

HISTORY AND POLITICAL SCIENCE.

Systematic instruction in history, (especially American,) has been given since 1876 by Mr. Austin Scott, Ph. D., of Washington; but his engagements with Mr. Bancroft, the historian, prevented him from giving his full time to our students, and the duties of an associate in history have devolved upon Mr. Herbert B. Adams, Ph. D., an Amherst graduate, who prosecuted his higher studies under

Bluntschli, at Heidelberg. A pleasing and substantial recognition of his relation to this distinguished jurist, who with Laboulaye and Lieber, have been called an international trifolium, has been made by the German citizens of Baltimore, who are about to present to the Johns Hopkins University the library of Bluntschli. It will be placed, with other works in historical and political science, in a convenient room which has been opened for the use of the seminary students in this department.

Political economy was taught during the years 1879–81 by Mr. H. C. Adams, Ph. D., now professor in the University of Michigan and lecturer in Cornell University, and during the year 1881–2 by Mr. Richard T. Ely, who now holds the position of an associate. Dr. Ely, after graduating in Columbia College, was a student in Heidelberg, where he was advanced to the degree of Ph. D.

In addition to the regular class instructions in history and political science from the persons already named, special courses have been given from time to time by non-resident lecturers. Our students have had the opportunity to hear Dr. H. von Holst, of the University of Freiburg, author of a constitutional history of the United States; Mr. E. A. Freeman, D. C. L., the historian of the Norman conquest; Mr. James Bryce, D. C. L.,

a regius professor in the University of Oxford, author of a work on the Holy Roman Empire; the greatly to be lamented Professor Diman, of Providence; Chief Justice Cooley, of Michigan; Gen. F. A. Walker, superintendent of the U. S. census; Professor Venable, of the law department of the University of Maryland; Prof. W. F. Allen, of the University of Wisconsin; Hon. J. J. Knox, comptroller of the currency; and Dr. H. C. Adams, now of the University of Michigan. It is not surprising to find that the young men among us have been greatly stimulated by these courses of lectures, and are themselves disposed to take up careful and prolonged inquiries upon important subjects suggested by their studies. Dr. H. B. Adams has led them to a series of interesting investigations upon the origin of American institutions. Aided by the various historical societies of this country, (especially our own, the Maryland Historical Society,) and availing himself of the local interests of a company of students drawn from widely separated parts of this country, he has secured from these pupils a valuable series of historical monographs which are about to be published under his editorial supervision. Mr. Freeman has written an introduction to this series. Four papers by Dr. Adams will first be printed, and then will come a series of essays, by the members of the seminary, on local government in the older States.

LOGIC, ETHICS, AND HISTORY OF PHILOSOPHY.

It has been from no want of interest in philosophical studies, that we have been delayed in making permanent arrangements in regard to them; but the scheme of lectures as now arranged offers some noteworthy opportunities.

Professor George S. Morris, Ph. D., who has spent a portion of every year among us since 1878, continues to lecture on the history of philosophy and on ethics. The fruit of his call to a congenial work may be seen not only in his own published volumes, but also in the series of philosophical studies which he is editing, beginning with his own study of Kant's Kritik, which was given to his students in this university in the course of last winter.

Mr. Charles S. Peirce, who has been for a long period a close student of the processes employed in various branches of physical investigation, and who is a proficient in more than one department of science, now offers to our students instruction in logic, or the method of methods, particularly for the benefit of those who are expecting to be engaged in investigation and who need fundamental guidance in the principles which underlie the discovery of scientific truth.

Several papers written by his followers in preceding years, with one of his own numerous

memoirs, hitherto unprinted, have been sent to the press and will soon be published. His rare collection of works upon logic, particularly rich in scholastic philosophy, has been acquired partly by purchase and partly by Mr. Peirce's generous gift.

Professor G. Stanley Hall, Ph. D., will hereafter direct our students in psychology, a service for which he has become fitted by his historical studies, by prolonged work in the laboratories of Leipsic and Berlin, and by varied experience as a lecturer in Harvard, Williams, and other colleges. Dr. Hall is desirous of awakening the attention of our students, particularly of those who expect to become teachers, to the importance of scientific pedagogics, and will doubtless offer some definite instruction in this subject.

EXAMINATIONS AND DEGREES.

Our staff of instructors is desirous of maintaining the best possible system of examinations, so that the degrees we confer and the certificates we give may be everywhere recognised as meaning what they say. There is danger on the one hand, where it is assumed that the instructor will be strict, that a knowledge on the part of his pupils of his ways and favourite points may lead to "cramming" to meet these points, and so the examination may appear to be of a rigid and

minute character, and yet may tell very little about the real acquisitions of the class; and on the other, where the instructor is known to be good natured, that the examination will be so slight that slipping through will be easy. But more than this, there is the natural infirmity of all persons, even the most conscientious, to be guarded against—that, namely, of a disinclination to see short-comings in the work of their own hands. When an instructor has had students under his charge for a year, he will be naturally reluctant, except in cases of exceptional or total failure, to certify that they have, after all, but a slender acquaintance with the subject they have been learning. It may very well be the case that this supposed failure on the part of the students examined may be entirely due to their own incompetence or carelessness; but the instructor can hardly help feeling that it may be otherwise interpreted, and accordingly his natural and probably unconscious leaning must be rather to pass as large a number of his class as possible, than to maintain the ideal standard of excellence which he probably had in his mind when he began to read the papers.

The only sure way of guarding against all these tendencies to bring down the character of examinations from the ideal standard is, as it seems to most of us, the employment of paid experts to act as coadjutors with the regular teachers in the work of examination. Each instructor in our under-

graduate classes is now encouraged to test, in his own way, the proficiency of his students, at frequent intervals during the session; and the result of this examination is recorded at the registrar's office at least twice in every academic year. The university, as a body, will hold one examination, instead of two as heretofore, of all candidates for the bachelor's degree, and will enlist, as far as practicable, for this service those who have not been teachers of the students to be examined. This plan has already been the regular usage in respect to the classes in Greek, Latin, German, and French—and is believed to be applicable elsewhere. We have received valued co-operation from Professors Maupin and Raddatz, of the city college, and from other non-resident professors.

In like manner, candidates for the second degree, (doctor of philosophy,) have in all cases been examined by the entire staff of professors, and often by some of the associates, and quite frequently by scholars of distinction holding chairs in other colleges and universities.

The effect of these regulations is to hold before the younger and the older candidates perpetually the notion that their attainments are to be judged by those who are strangers to them, and that their standing depends on the knowledge they show of a subject, rather than on their familiarity with a text book. As a means of intellectual discipline,

testing at intervals all the faculties of a student, his accuracy, his discrimination, his judgment, his memory, and his range, nothing better has been devised.

Each candidate for the bachelor's degree has been required to pursue during his undergraduate career, at least five courses of study, two of them, called major courses, implying that, by a two years' course, he has become proficient in each subject, and three other, minor courses, each of which he has studied for at least a year. An additional course, known as the composite minor, consisting of lectures and exercises in ethics, history, and English, and equivalent, as a whole, to one of the other minor courses, has been recently arranged. This will hereafter be required, in addition to the three other minor courses, from all candidates for the bachelor's degree.

The preference of courses shown by the forty-six persons who have taken the bachelor's degree, during the last four years, is exhibited by the following table:

	Major Courses.	Minor Courses.		Major Courses.	Minor Courses.
Latin,	21	9	Biology,	6	1
German,	17	27	French,	2	27
Greek,	12	5	Philosophy,	1	3
Chemistry,	11	10	English,		5
History,	10	12	Logic,		1
Mathematics,	7	3	Mineralogy,		1
Physics,	6	30			

The number of undergraduates who have come forward to the baccalaureate degree, during the

year, is fifteen, making the whole number of bachelors of arts, here created in four years, forty-six. The names of those graduating in 1881–82, are as follows:

William H. Adkins, Easton.
T. Alexis Berry, Baltimore.
Gustav Bissing, Baltimore.
Walter B. Clarkson, Baltimore.
Hermann L. Ebeling, Catonsville.
Louis Garthe, Baltimore.
Edward Ingle, Baltimore.
Richard F. Kimball, Baltimore.
Gustav A. Liebig, Jr., Baltimore.
C. W. Emil Miller, Baltimore.
James Page, Baltimore.
Albert G. Palmer, Baltimore.
Robert M. Reese, Baltimore.
Lewis T. Stevens, Baltimore.
Herbert T. Tiffany, Baltimore

Nine candidates who had presented the requisite theses and had also passed the examinations successfully, were made doctors of philosophy. The whole number of persons admitted among us to this second degree is thirty-three. Nearly all of these are looking forward to the profession of teaching as a career in life; twenty-nine of them have already received appointments in colleges and other educational establishments.

The names of the doctors of philosophy (1881–82) and the titles of their theses are as follows:

James W. Bright, of Lock Haven, Pa., A. B., Lafayette College, 1877, and A. M., 1880. His principal study was the Teutonic languages, the subordinate, Sanskrit. He submitted a thesis entitled "A Discussion of the Verbal forms in King Alfred's West-Saxon Version of Gregory's *Cura Pastoralis*."

J. Franklin Jameson, of Amherst, Mass., A. B., Amherst College, 1879. His principal study was history, the subordinate, political economy. His thesis on "The Origin and Development of the Municipal Government of New York City," is in course of publication in the *Magazine of American History*.

Mitsuru Kuhara, Tsuyama, Japan, S. B., University of Tokio, 1877. His principal study was chemistry, the subordinate, mineralogy. His thesis on the "Oxidation of Nitrometaxylene," has been published, in modified form, in the *American Chemical Journal*.

Robert W. Mahon, of Baltimore, C.E., Lehigh University, 1876. His principal subject was chemistry, his subordinate, physics. His thesis on "Some Investigations on the Benzyl-derivatives of the Sulphamides of Metaxylene," has been published in modified form, in the *American Chemical Journal.*

Oscar H. Mitchell, of Marietta, Ohio, A. B., Marietta College, 1875, and A. M., 1878. His principal subject was mathematics, the subordinate, logic. His thesis, entitled "Some Theorems in Numbers, with a Generalization of Fermat's and Wilson's Theorems," has been published in the *American Journal of Mathematics.*

George F. Nicolassen, of Baltimore, A. B., University of Virginia, 1879, and A. M., 1880. His principal subject was Greek, the subordinate, Latin. His thesis on "The Articular Infinitive in Xenophon," will be prepared for publication.

William A. Noyes, of Grinnell, Iowa, A. B., Iowa College, 1879. His principal subject was chemistry, the subordinate, physics. His thesis "On the Protection from Oxidation of a Group containing two Carbon-Atoms," has been published, in modified form, in the *American Chemical Journal.*

Chase Palmer, of Baltimore, A. B., Johns Hopkins University, 1879. His principal subject was chemistry, the subordinate, mineralogy. His thesis "On the Sulphocinnamic Acids," has appeared, in modified form, in the *American Chemical Journal.*

Edward H. Spieker, of Baltimore, A. B., Johns Hopkins University, 1879. His principal subject was Greek, the subordinate subjects, Latin, Sanskrit, and Hebrew. His thesis "On the so-called Genitive Absolute and its use, especially in the Attic Orators," will be prepared for publication.

Fellowships and Scholarships.

The system of fellowships which has been adopted here, has been most fruitful in good results, as may readily be discovered from a scrutiny of the roll of fellows, and by reference to the bibliography which is printed in the appendix. If any proof of the value of the system is needed beyond our own experience, it may be found in the fact that its essential features have been followed in two foreign universities, and are now reported

to be under consideration in a third. A statement of the scheme of fellowships and of the rules under which they are awarded is made in the appendix.

The founder of the university provided for the establishment of certain scholarships. His language upon this subject is as follows:

"And I further request the trustees of the said university to establish from time to time, such number of free scholarships in the said university as may be judicious, and to distribute the said scholarships amongst such candidates from the States of Maryland, Virginia, and North Carolina, as may be most deserving of choice, because of their character and intellectual promise; and to educate the young men, so chosen, free of charge."

Twenty such scholarships, known as Hopkins Scholarships, freeing the holders from charges for tuition, were offered at the commencement of the university to young men who needed this assistance, and more have been since annually awarded. No publicity has been given to the names of those appointed. During the past six years, seventy young men from the States designated have received the benefit of this provision.

By a contribution from the president and professors, two graduate scholarships, of two hundred and fifty dollars each, were bestowed during the year 1879–80; and during each of the two following years, ten graduate scholarships of the same value have been bestowed from the university income upon students who gave special evidence to the faculty of exceptional merit in the prosecution of their studies.

A scholarship, yielding three hundred and fifty dollars, contributed by two friends of the university, was also awarded in 1880 for the encouragement of special study in philosophical subjects. Of the sum above named, $250 were given by Mr. Allan Marquand, and $100 were added by one of the trustees, for the further encouragement of the chosen recipient.

To show his interest in the Baltimore City College, an officer of the university has given, for three years, a premium of one hundred dollars to that graduate of the city college who passed the best matriculation examination on his admission to the university. Although the persons who have received this prize are in all respects excellent and promising students, its general influence has not been sufficiently marked to encourage a renewal of the offer.

University Societies, etc.

Several associations, composed of members of the faculty and advanced students, meet regularly for the presentation and discussion of original papers. The circulars contain abstracts of the more important communications. There are also reading clubs for the regular examination of the scientific periodicals which are received in such abundance.

These societies are:

1. The Scientific Association, meeting under the presidency of Professor Sylvester.
2. The Philological Association, meeting under the presidency of Professor Gildersleeve.
3. The Mathematical Society, meeting under the presidency of Professor Sylvester.
4. The Historical Association, of which Dr. H. B. Adams is the secretary.
5. The Metaphysical Club, of which Professor C. S. Peirce is the head.
6. A Naturalists' Field Club, organized under the leadership of Professor Martin.

Reading clubs are organized in:

Chemistry, under Professor Remsen and Dr. Morse.
Biology, under Professor Martin and Dr. Brooks.
Physics, under Professor Rowland and Dr. Hastings.

THE LIBRARY.

It has been found of so great advantage that those members of the university who are engaged in original research or other advanced work, shall have at hand those books which are needed in their studies or investigations, that there is at present a growing tendency in the library department to develop in the direction of special libraries auxiliary to the leading branches of study, and placed in the rooms where those studies are carried on. The nuclei of such special libraries have already been formed in the departments of Greek, chemistry, history, political economy, and education; and it seems probable that other departments will, in the course of time, adopt this plan, leaving the main collection to assume more and more the character of a library of general reference.

The close association of those following similar researches, and animated by the same zeal, is an active stimulus and a great help to work; and this is still further assisted by placing those books which are most likely to be needed, or which specially bear upon the work, within easy reach of the worker's hand.

The library now includes 13,200 bound volumes, purchased at a cost of $38,000. It is open daily for thirteen hours, and comprises:

A collection of books for general reference, including not only cyclopædias and dictionaries, but copies of the works of great authors, ancient and modern, in different branches of literature and science;

Special collections of books which have been bought as the working apparatus of the chief departments of study, from lists which have been furnished by the several instructors, and which are placed either in the main library, or in the special libraries above referred to;

A transient collection of new books, English, French, and German, brought here for examination as soon as published, sometimes by purchase, and sometimes by the courtesy of dealers;

A collection of scientific and literary periodicals, now numbering three hundred and thirty-eight. This list is supplemented by those of the Peabody Institute and other institutions of the city, so that

the whole number of journals accessible to students (exclusive of ephemeral publications) exceeds seven hundred. They pertain to all departments of knowledge and come from all parts of the globe.

I would here call attention to the very useful as well as beautiful system on which the libraries of Baltimore have been planted and are growing.

In the first place, there is the Peabody Library, a great storehouse of reference works, well arranged in a noble building, thoroughly catalogued and indexed, accessible to all students from 9 a. m. to 9 p. m., without charge.

Next, there are the collections of the Johns Hopkins University. These are the books of the laboratory and the seminary, that is to say, special libraries formed by specialists for special purposes, and distributed accordingly in many different apartments where they may be most readily reached by those who wish to work with them.

These collections are soon to be supplemented by the Enoch Pratt Free Library. This is a library for circulation, where books may not only be read, but where they may be also borrowed for home reading. Its use will be open to all, without charge.

Near by is a social library, the Mercantile, which has recently been provided with excellent quarters, by the enlightened policy of its president; a place where the current magazines and journals as well as popular books may readily be seen.

There is also the remarkable collection of the Maryland Historical Society, rich in Americana, and especially in manuscripts, pamphlets, and books pertaining to Maryland and the adjacent region.

There are also three professional libraries, that of the Baltimore Bar, and of the Medical and Chirurgical Faculty, maintained by the legal and medical men of the city, and the Stinnecke collection in ecclesiastical history and theology, founded by Bishop Whittingham.

The city has also its important collections of municipal documents in the city hall.

It thus appears that according to his needs the student may have access to a storehouse of books, a literary laboratory, a circulating library, and to the special apparatus of the historian, the civic officer, the physician, the jurist, and the theologian. All these collections are included within a circle of a half-mile radius, in the centre of which stands the Enoch Pratt Free Library, like a central fountain for popular resort. Is not Baltimore in its library policy an example to other cities?

The number of bound volumes in the principal libraries of the city is:

Peabody Library,	77,000
Mercantile Library,	37,700
Maryland Historical Society,	22,000
Johns Hopkins University,	13,200
Bar Library,	8,800
Medical and Chirurgical Library,	3,300
Whittingham Library,	17,000
	179,000

The principal libraries of Washington, which are readily accessible to our students, include the Library of Congress, with 650,000 books and pamphlets; that of the Surgeon General's Office, with 120,000; that of the Bureau of Education, with 50,000; as well as those of the various administrative bureaus and scientific departments of the government.

PUBLIC LECTURES.

Our system of public lectures is now, I think, generally understood, but it may interest even those who are most familiar with them, to look back and see how many courses have been given within the last six years, and how many eminent men from a distance have been among us. These lectures are chiefly designed to be supplementary to our regular classes. Attendance upon them is voluntary, and no credit is given on our books for being present, but the brighter young men are quick enough to discover what excellent opportunities are afforded in these courses for the acquisition of knowledge, and they need no other encouragement to attend. Incidentally the university receives much benefit from the frequent presence of strangers among us, and more than one of our advanced scholars attributes his subsequent career to the acquaintance formed in our hall with professors from other institutions.

The public have been admitted to these lectures as freely as was possible in the very limited space at command. When there has been a demand for more cards of admission than there were sittings, invitations have been given first to those who were known to us as special students of the subject of the lecture, and next to those who were engaged in teaching. The audiences have thus been made up almost wholly of those who could enjoy and profit by academic instruction.

The following table shows the names of the lecturers, their subjects, the number of lectures given, and the average attendance for each course, according to the door-keeper's count. Some lectures, as those by Professor Cayley on mathematical subjects, and those by Mr. C. S. Peirce on mathematical logic, are not included in the statement, because they were not intended for any but special scholars.

Subject.	Lecturer.	Average Attendance.
National Debts, (9),	H. C. Adams,	41
Religion and Government in the Ancient World, (2),	H. B. Adams,	19
Beginnings of Church and State, (10),	H. B. Adams,	83
Italian Renaissance, (10),	H. B. Adams,	212
Teutons in Church and State, (5),	H. B. Adams,	212
Internationalism, (5),	H. B. Adams,	193
History of the Fourteenth Century, (20),	W. F. Allen,	96
Photophone and Spectrophone, (1),	A. Graham Bell,	235
History of Medicine, etc., (20),	J. S. Billings,	49
German Literature prior to the Classical Period, (9),	H. C. G. Brandt,	42
Theories of Biology, (16),	W. K. Brooks,	30
Recent Studies of the Crab and the Oyster, (3),	W. K. Brooks,	78

Subject.	Lecturer.	Average Attendance.
Recent Political Discussions in England, (6),	J. Bryce,	169
Chaucer, (20),	F. J. Child,	191
Ballads of England and Scotland, (20),	F. J. Child,	137
Shakespeare's Plays: Hamlet, Macbeth, (10),	F. J. Child,	195
Early England, (6),	A. S. Cook,	196
Torts, (20),	T. M. Cooley,	87
Recent Amendments to the Constitution of the United States, (6),	T. M. Cooley,	103
Evils in Local Government, (6),	T. M. Cooley,	87
The New Testament, (10),	J. M. Cross,	12
Thirty Years' War, (20),	J. L. Diman,	192
Dante, (10),	A. M. Elliott,	152
The Civil Service, with special reference to that of Prussia, (4),	R. T. Ely,	63
Selected Botanical Subjects, (6),	W. G. Farlow,	89
Historical Geography of South-eastern Europe, etc., (6),	E. A. Freeman,	91
Greek Lyric Poetry, (20),	B. L. Gildersleeve,	42
Homer's Odyssey, (20),	B. L. Gildersleeve,	153
Introductory to Greek Prose Literature, (12),	B. L. Gildersleeve,	80
Greek Tragic Poets, (9),	B. L. Gildersleeve,	114
Republic of Plato, (3),	W. W. Goodwin,	152
Psychology, (10),	G. S. Hall,	190
Clear Thinking and its Best Modern Methods, (5),	G. B. Halsted,	61
Theory of Sound in its Relation to Music, (6),	C. S. Hastings,	162
Light, (4),	C. S. Hastings,	208
Territorial Surveys, (20),	J. E. Hilgard,	21
The Senses and the Brain and their Relation to Thought, (10),	W. James,	62
Banking Systems of the United States, (3),	J. J. Knox,	175
Sun and Radiant Energy, (6),	S. P. Langley,	207
English Verse, (16),	Sidney Lanier,	170
English Literature, (12),	Sidney Lanier,	195
The Vedas, (6),	C. R. Lanman,	151
Early French and Italian Literature, (20),	J. R. Lowell,	179
Waste Products of Chemical Manufacture, (20),	J. W. Mallet,	29
History of the Chief Branches of Chemical Industry, (20),	J. W. Mallet,	45
General Biology, (20),	H. N. Martin,	66

Subject.	Lecturer.	Average Attendance.
The Human Body, (4),	H. N. Martin,	249
The Political Situation in Eastern Europe, (4),	D. McG. Means,	70
Political Economy in the United States, (4),	D. McG. Means,	15
Theory of Development, (7),	J. McCrady,	197
General History of Philosophy, (20),	G. S. Morris,	124
Topics in Ethics, (14),	G. S. Morris,	123
British Thought and Thinkers, (12),	G. S. Morris,	123
History of German Philosophy, (6),	G. S. Morris,	148
The Hebrew Scriptures, (9),	T. C. Murray,	41
History of Astronomy, (20),	S. Newcomb,	50
History of the Formation of the French Language (*in French*), (19),	L. Rabillon,	20
History and Evolution of the French Language (*in French*), (20),	L. Rabillon,	48
French Romantic Literature (*in French*), (11),	L. Rabillon,	35
French Epic Poetry (*in French*), (12),	L. Rabillon,	57
Readings in Corneille, Molière, etc. (*in French*), (12),	L. Rabillon,	47
Satirists of France (*in French*), (12),	L. Rabillon,	58
French Poetry, etc. (*in French*), (10),	L. Rabillon,	56
French Literature (two courses) (*in French*), (24),	L. Rabillon,	48
History of Chemistry, (12),	I. Remsen,	111
Selected Topics in Chemistry, (4),	I. Remsen,	229
Conservation of Energy, (4),	H. A. Rowland,	183
Studies on the "Return to Kant," (5),	J. Royce,	18
Poetry of the German Romantic School, (8),	J. Royce,	33
Cyprus and Mycenae, (8),	A. D. Savage,	81
English History, (12),	A. Scott,	37
Development of the U. S. Constitution, (10),	A. Scott,	99
Greece in the Fifth Century, B. C., (10),	E. G. Sihler,	39
Attic Life and Society, (8),	E. G. Sihler,	30
Laws of Verse, (1),	J. J. Sylvester,	235
Philosophy of Physics, (12),	J. Trowbridge,	142
Constitutional Law, (12),	R. M. Venable,	103
The German Empire, (10),	H. von Holst,	258
Money, (20),	F. A. Walker,	49
Finance, (21),	F. A. Walker,	44
Historical Development of the Inflective Structure of the Indo-European Languages, (18),	W. D. Whitney,	84

Special courses of lectures and demonstrations in respect to the recent progress of physiology, have been given to medical men by Professor Martin, Dr. Sewall, etc.

An effort has also been made to be of service to the teachers of Baltimore, not only by admitting them to public lectures, but also by establishing special Saturday classes for their benefit. The following courses, to which teachers only were admitted, have been given:

1. On Physiology, by Professor Martin, twenty lectures, accompanied by practical instruction in twenty weekly exercises, in the biological laboratory.
2. On Elementary Zoölogy, by Dr. Brooks, fifteen lectures and forty-five hours of connected work in the biological laboratory.
3. On the theory of Numbers, by Dr. W. E. Story, ten lectures.
4. On improved methods of beginning the study of Latin, twenty exercises by Professor C. D. Morris.
5. On Early English, by Mr. A. S. Cook, twelve lectures on the basis of a simple Anglo-Saxon text.

The attendance at all these lectures was as punctual and regular as if a degree depended on it, and at the close of each course there was a grateful recognition on the part of the class, of the benefits they had received.

Many of the instructors have also lectured by invitation before associations in different parts of the city and in its neighborhood. This is no part of the official work of our staff and no report is made of it, but it has pleased me, and I am sure it will please others, to notice in how many local

institutions the officers of the university have, by invitation, delivered lectures or addresses.

University of Maryland (Medical Faculty.)
Medical and Chirurgical Faculty of Maryland.
Peabody Institute.
Maryland Institute.
McDonogh Institute.
Canton Institute.
Woodberry Institute.
Baltimore and Ohio employees.
St. Peter's Brotherhood.
St. Michael's Guild.
Maryland Historical Society.
Maryland Academy of Sciences.
Young Men's Christian Association.
State Normal School.
Baltimore County Teachers' Association.
Baltimore City Teachers' Association.
Educational Conference of Friends.
Various private schools.
Etc., etc.

It would be much more difficult for me to give an idea of the charitable and benevolent services in which the members of the university take part, but I may mention as particularly good the instructions of some of our young men on Sundays among the inmates of the penitentiary and in various mission schools.

Publications.

As soon as the academic staff of the university came together, it was obvious that means should be provided for the publication of their scientific and literary papers. The want was first felt in the department of mathematics. It was suggested to Professor Sylvester that he should ask his colleagues in the London Journal of Mathematics to transfer its publication to Baltimore, but on further consideration it appeared that the mathematicians

of this country were agreed in desiring to see an American periodical devoted to the most advanced investigations in this science. A large number of letters were received from college professors and from the mathematicians in the government service commending a plan submitted to them for the publication of such a journal. The trustees having promised their pecuniary aid, the first number of the American Journal of Mathematics was published in quarto form in 1878. Four volumes have since been issued, and there appears to be no want of material for its continuance. Dr. Story, Dr. Franklin, and Dr. Craig have successively given their assistance to the editor, Professor Sylvester, in the conduct of the journal.

The work of the chemists next came under consideration. Such papers as they had to offer were too extended to be printed in the American Journal of Science, and it was inconvenient to continue sending them to Germany; and so, after various propositions had been duly weighed, the determination was reached to publish in Baltimore the American Chemical Journal, to be edited by Professor Remsen. The trustees promised their assistance, and three annual volumes have now appeared, containing contributions from the principal chemical laboratories of this country. The issue began in April, 1879.

To promote the study of language, Professor Gildersleeve was led to begin the American

Journal of Philology, encouraged partly by the numerous promises of co-operation received from widely separated philological students, and partly by the assurance that his effort would be sustained to a certain extent by the university. The first number appeared in February, 1880, and the third volume is now in progress.

The biological papers have been printed in various forms. Some were contributed to the Journal of Physiology; some were printed at the expense of a few generous friends of the university; and others at the cost of the Johns Hopkins fund. They have been collected under the editorial supervision of Professor Martin and Dr. Brooks, with the title of Studies from the Biological Laboratory. Unlike the publications already referred to, these papers are only by members of our own staff, the teachers and students of biology.

The volume of Contributions to Logic now in press, under the editorial care of Mr. C. S. Peirce, will contain papers with the following titles:

The logic of the Epicureans, by Allan Marquand.
On the algebra of logic, by Miss Ladd.
On the algebra of logic, by O. H. Mitchell.
On relative numbers, by B. I. Gilman.
On probable inference, by C. S. Peirce.

The early numbers of the Studies in Historical and Political Science, edited by Dr. H. B. Adams, will include the following papers:

Introduction to American institutional history, by E. A. Freeman.
The Germanic origin of New England towns, by H. B. Adams.

Saxon tithingmen in America, by H. B. Adams.
Norman constables in America, by H. B. Adams.
Village communities in America,—Cape Ann and Salem plantations, by H. B. Adams.
Local government in Illinois, by Albert Shaw.
Local government in Pennsylvania, by E. R. L. Gould.
Origin and development of the municipal government of New York City, by J. F. Jameson.
Administration of Berlin compared with that of New York, by R. T. Ely.
Local self-government in South Carolina, etc., by B. J. Ramage.
Local institutions of Ohio—Indian, French, and English, by John T. Short and S. C. Derby.
Local government of Michigan and the North-west, by E. W. Bemis.
French and English institutions of Wisconsin, by W. F. Allen.
Civil government in Iowa, by Jesse Macy.
Old town institutions of Maryland, by L. W. Wilhelm.
Old Maryland manors, by John Johnson.
Parish institutions of Maryland, by E. Ingle.
Free schools in Maryland, by Basil Sollers and L. W. Wilhelm.
The institutions of North Carolina, by Henry E. Shepherd.
Montauk and the common lands of Easthampton, Long Island, by J. F. Jameson.

Since the opening in 1876, it has been found convenient to issue frequent statements in respect to the development of our plans. The earliest of these official circulars were printed in octavo. Nearly three years ago the form was changed to a quarto, and some of the features of the University Reporter of Cambridge, England, were introduced, particularly current announcements of lectures and courses of instruction. These bulletins were originally designed for the information of those who were connected with this university, or who wished to enter it; but they soon proved to be a convenient channel for acquainting the public at large with the condition of the foundation, and for spread-

ing information in respect to scientific and literary investigations which were here in progress. Gradually the reports of society meetings, and the synopses of scientific papers claimed more and more space, and a demand for the successive circulars was indicated far beyond the company for which the original publication had been designed; and even to a limited extent in foreign countries.

It is now thought best to modify in some particulars the plan of the circulars, so as to give still more space to the original work of the professors in the university and their more advanced students, without omitting the current information in respect to the plans of instruction, the rolls of attendance, and other purely local matters.

Our publications are offered to subscribers, and are also the basis of important exchanges with foreign institutions and journals, as well as with many in this country.

Conclusion.

Such is the report which may be made to the trustees, and through them to the public, of the beginnings of the Johns Hopkins University. No one knows better than those who are engaged in its service, how many circumstances have favored this institution. Large funds bestowed by a large-minded benefactor; carefully drawn and wisely

considered instruments by which the corporation was organized; trustees who had no personal ends to promote, but were eager to secure the best possible results and were liberal and co-operative in all their official actions; able teachers thoroughly interested in their work; citizens watching with the closest scrutiny and with encouraging words all our announcements; neighboring foundations, (in several of which the Hopkins trustees were enlisted), ready to lend a helping hand; newspapers whose columns have been open to the record of every progressive step; and moreover, students of talent and industry eager to avail themselves of the opportunities here afforded; these have been the factors of our brief history.

There is still much to be done. Near at hand must be the initiation of a department of medicine. Other important subjects, hitherto passed by, must soon receive attention. I will not now dwell upon these points. I will only add my personal acknowledgments to the governing bodies, the trustees and teachers, for their considerate counsel and generous co-operation during the past six years, and especially for their kindness and helpfulness during the last year when, by reason of ill-health, I was so long prevented from discharging my usual duties. I am reminded that four of the twelve trustees who organized this university, are no longer members of the board. Let me renew an expres-

sion of my obligations to one who is deceased, to Galloway Cheston, a friend of the founder, and first president of the trustees, whose wisdom, moderation, and farsightedness have helped to lay firmly the foundations on which we are building.

DANIEL C. GILMAN,
President of the Johns Hopkins University.

BALTIMORE, *October* 2, 1882.

APPENDIX.

A.

Academic Staff, 1876-82.*

PRESIDENT.

	Appointed.
DANIEL C. GILMAN, ...	*December* 30, 1874.

PROFESSORS.

		Appointed.
BASIL L. GILDERSLEEVE,	*Greek*, . . .	1876.
J. J. SYLVESTER, . .	*Mathematics*, . .	1876.
IRA REMSEN, . .	*Chemistry*, . .	1876.
HENRY A. ROWLAND, .	*Physics*, . . .	1876.
H. NEWELL MARTIN, .	*Biology*, . . .	1876.
CHARLES D. MORRIS, .	*Classics*, . . .	1876.

ASSOCIATES.

		Years of Service.
JOHN M. CROSS, . .	*Greek*, . . .	1876–1881.
PHILIP R. UHLER, . .	*Natural History*, .	1876–
AUSTIN SCOTT, . .	*History*, . . .	1876–1882.
A. MARSHALL ELLIOTT, .	*Romance Philology*, .	1876–
THOMAS C. MURRAY, .	*Shemitic*, . . .	1876–1879.
HERMAN C. G. BRANDT, .	*German*, . . .	1876–1882.
WILLIAM K. BROOKS, .	*Biology*, . . .	1876–
HARMON N. MORSE, .	*Chemistry*, . .	1876–
ROBERT RIDGWAY, . .	*Natural History*, .	1876–1877.
WILLIAM E. STORY, .	*Mathematics*, . .	1876–
ARTHUR W. TYLER, .	*Librarian*, . .	1876–1878.
CHARLES S. HASTINGS, .	*Physics*, . . .	1876–
CHARLES R. LANMAN, .	*Sanskrit*, . . .	1877–1880.
HERBERT B. ADAMS, .	*History*, . . .	1878–
ALBERT S. COOK, . .	*English*, . . .	1879–1881.
MINTON WARREN, . .	*Latin*, . . .	1879–
WILLIAM HAND BROWNE,	*Librarian*, . .	1879–

*The names in each group are arranged in the order of appointment.

		Years of Service.
HENRY SEWALL,	*Biology*,	1880–1882.
THOMAS CRAIG,	*Mathematics*,	1880–
MAURICE BLOOMFIELD,	*Sanskrit*,	1881–
WILLIAM T. SEDGWICK,	*Biology*,	1881–
HENRY WOOD,	*English*,	1881–
FABIAN FRANKLIN,	*Mathematics*,	1882–
RICHARD T. ELY,	*Political Economy*,	1882–

LECTURERS.

SIMON NEWCOMB,	*Astronomy*,	1876.
LÉONCE RABILLON,	*French*,	1876–
JOHN S. BILLINGS,	*Medical History, etc.*,	1877.
FRANCIS J. CHILD,	*Early English, etc.*,	1877–1878.
THOMAS M. COOLEY,	*Law*,	1877–1879.
JULIUS E. HILGARD,	*Geodetic Surveys*,	1877.
JAMES RUSSELL LOWELL,	*Romance Literature*,	1877.
JOHN W. MALLET,	*Technological Chemistry*,	1877–1878.
FRANCIS A. WALKER,	*Political Economy*,	1877–1878.
WILLIAM D. WHITNEY,	*Comparative Philology*,	1877.
WILLIAM F. ALLEN,	*History*,	1878.
WILLIAM JAMES,	*Psychology*,	1878.
GEORGE S. MORRIS,	*Philosophy*,	1878–
J. LEWIS DIMAN,	*History*,	1879.
H. VON HOLST,	*History*,	1879.
WILLIAM G. FARLOW,	*Botany*,	1879.
J. WILLARD GIBBS,	*Theoretical Mechanics*,	1879.
SIDNEY LANIER,	*English Literature*,	1879–1881.
CHARLES S. PEIRCE,	*Logic*,	1879–
JOHN TROWBRIDGE,	*Physics*,	1880.
A. GRAHAM BELL,	*Phonology*,	1881.
S. P. LANGLEY,	*Physics*,	1881.
JOHN MCCRADY,	*Biology*,	1881.
JAMES BRYCE,	*Political Science*,	1881
EDWARD A. FREEMAN,	*History*,	1881.
JOHN J. KNOX,	*Banking*,	1881.
ARTHUR CAYLEY,	*Mathematics*,	1882.
WILLIAM W. GOODWIN,	*Plato*,	1882.

		Years of Service.
G. Stanley Hall,	*Psychology,*	1882–
Richard M. Venable,	*Constitutional Law,*	1882.
James A. Harrison,	*Anglo-Saxon,*	1882–
J. Rendel Harris,	*New Testament Greek,*	1882–

INSTRUCTORS AND ASSISTANTS.

Henry Sewall,	*Biology,*	1876–1878.
Samuel F. Clarke,	*Biology,*	1879–1881.
Fabian Franklin,	*Mathematics,*	1879–1882.
Lyman B. Hall,	*Chemistry,*	1879–1880.
Christian Sihler,	*Biology,*	1879–1880.
Henry C. Adams,	*Political Economy,*	1879–1881.
Thomas Craig,	*Mathematics,*	1879–1880.
Chas. L. Woodworth,	*Elocution,*	1879–
William T. Sedgwick,	*Biology,*	1880–1881.
Edwin H. Hall,	*Physics,*	1880–1881.
George H. Stockbridge,	*Latin and German,*	1880–1881.
Philippe B. Marcou,	*French,*	1880–
Hugh Newell,	*Drawing,*	1880–
R. Dorsey Coale,	*Chemistry,*	1881–
Richard T. Ely,	*Political Economy,*	1881–1882.
Lawrence B. Fletcher,	*Physics,*	1881.
George F. Nicolassen,	*Greek and Latin,*	1881–1882.
Benjamin E. Smith,	*Philosophy,*	1881–1882.
Edmund B. Wilson,	*Biology,*	1881–1882.
James W. Bright,	*German,*	1882–
J. Franklin Jameson,	*History,*	1882–
Edward H. Spieker,	*Greek and Latin,*	1882–
Harry F. Reid,	*Physics,*	1882–

B.

Roll of Fellows.

The following list gives the names of all persons who have been selected by the authorities and appointed to fellowships. Though, in a few cases, by reason of promotion or other causes, the persons designated have not entered upon the fellowships, their names are given to exhibit fully the working of this system of appointment.

The present position or residence of the former holders of fellowships is, in most cases, given after the name.

Years of Service.

HENRY C. ADAMS, PH. D., . . *Political Science*, . 1876–1879.
Lecturer on Political Economy, University of Michigan.

HERBERT B. ADAMS, PH. D., . . *History*, . . . 1876–1878.
Associate in History, Johns Hopkins University.

WILLIAM K. BROOKS, PH. D., . . *Biology*, . . .
Associate in Biology, and Director of Chesapeake Zoölogical Laboratory, Johns Hopkins University. (*Appointed Associate*, 1876, *before entering on the Fellowship*).

THOMAS CRAIG, PH. D., . . . *Mathematics*, . . 1876–1879.
Associate in Mathematics, Johns Hopkins University.

JOSHUA W. GORE, C. E., . . . *Mathematics*, . . 1876–1878.
Professor of Natural Science, University of North Carolina.

GEORGE B. HALSTED, PH. D., . . *Mathematics*, . . 1876–1878.
Instructor in Post-Graduate Mathematics, Princeton College.

EDWARD HART, PH. D., . . . *Chemistry*, . . 1876–1878.
Assistant Professor of Chemistry, Lafayette College.

DANIEL W. HERING, C. E., . . *Engineering*, . . 1876–1878.
Professor of Mathematics, Western Maryland College.

MALVERN W. ILES, PH. D., . . *Chemistry*, . . 1876–1878.
Chemist, Leadville, Colorado.

WILLIAM W. JACQUES, PH. D., . *Physics*, . . . 1876–1879.
Electrician of the American Bell Telephone Co., Boston, Mass.

CHARLES R. LANMAN, PH. D., . . *Sanskrit*, . . . 1876–1877.
Professor of Sanskrit, Harvard University.

D. MCGREGOR MEANS, A. B., . . *Political Science*, . 1876–1877.
Late Professor of Political and Mental Science, Middlebury College; Attorney at Law, New York City.

HARMON N. MORSE, PH. D., . . *Chemistry*, . .
Associate in Chemistry, Johns Hopkins University. (*Appointed Associate*, 1876, *before entering upon the Fellowship*).

WALTER H. PAGE, ... *Greek*, . . . 1876–1878.
Late Professor in the Louisville (Ky.) High School.

P. PORTER POINIER, M. E., . . *Physics*, . . .
(*Died without entering upon the Fellowship, June*, 1876, *aged 23 years*).

E. DARWIN PRESTON, C. E., . . *Engineering*, . . 1876–1878.
U. S. Coast and Geodetic Survey, Washington, D. C.

HENRY J. RICE, SC. D., . . . *Biology*, . . . 1876–1878.
Professor of Natural Sciences, Michigan Military Academy, Orchard Lake, Mich.

JOSIAH ROYCE, PH. D., . . . *Philosophy*, . . 1876–1878.
Instructor in Philosophy, Harvard University.

ERNEST G. SIHLER, PH. D., . . *Greek*, . . . 1876–1879.
Classical Instructor, New York City.

FREDERICK B. VAN VORST, A. B., . *Ethics & Metaphysics*, 1876–1877.
Attorney at Law, New York City.

JOHN H. WHEELER, PH. D., . . *Philology*, . . 1876–1877.
Professor of Greek, University of Virginia.

SAMUEL F. CLARKE, PH. D., . . *Biology*, . . . 1876–1879.
Professor of Natural History, Williams College.

LYMAN B. HALL, PH. D., . . *Chemistry*, . . 1877–1879.
Professor of Chemistry and Physics, Haverford College, Pa.

A. DUNCAN SAVAGE, B. LITT., . . *Greek*, . . . 1876–1879.
Metropolitan Museum of Art, New York City, 1879–81.

FABIAN FRANKLIN, PH. D., . . *Mathematics*, . . 1877–1879.
Associate in Mathematics, Johns Hopkins University.

CHRISTIAN SIHLER, PH. D., . . *Biology*, . . . 1877–1879.
Physician, Cleveland, Ohio.

FRANCIS G. ALLINSON, PH. D., . *Greek and Sanskrit*, 1877–1880.
Assistant Professor of Greek and Latin, Haverford College, 1880–82; Classical Instructor, Baltimore.

MAURICE BLOOMFIELD, PH. D., . *Sanskrit and Greek*, 1878–1879.
Associate in Sanskrit, Johns Hopkins University.

CONSTANTINE FAHLBERG, PH. D., . *Chemistry*, . . 1878–1880.
Chemist, Gray's Ferry Chemical Works, Philadelphia.

EDWIN H. HALL, PH. D., . . . *Physics*, . . . 1878–1880.
Instructor in Physics, Harvard University.

EDWARD COLES HARDING, A. M., . *Greek*, . . . 1878–1879.
Professor of Greek, University of Louisiana, 1879–80.

ISAAC OTT, M. D., ... *Biology*, . . . 1878–1879.
Physician, Easton, Pa.

HENRY SEWALL, PH. D., . . . *Biology*, . . . 1878–1879.
Professor of Physiology, University of Michigan.

WASHINGTON I. STRINGHAM, PH. D., *Mathematics*, . . 1878–1880.
Professor of Mathematics, University of California.

ABRAM V. E. YOUNG, PH. B., . . *Chemistry*, . . 1878–1880.
Student of Chemistry, Paris, France.

CHARLES R. HEMPHILL, A. M., . *Greek*, . . . 1878–1879.
Professor, Theological Seminary, Columbia, S. C.

ALLAN MARQUAND, PH. D., . . *Logic and Ethics*, . 1877–1880.
Lecturer on Modern Logic and Tutor in Latin, Princeton College.

CHARLES A. VAN VELZER, S. B., . *Mathematics*, . . 1878–1881.
Instructor in Mathematics, University of Wisconsin.

BROWN AYRES, S. B., . . . *Physics*, . . . 1879–1880.
Professor of Physics, University of Louisiana, New Orleans.

LOUIS BEVIER, PH. D., . . . *Greek*, . . . 1879–1881.
Student of Philology, University of Bonn.

EDWARD M. HARTWELL, PH. D., . *Biology*, . . . 1879–1881.
Physician, Cincinnati, Ohio.

JOHN R. MCD. IRBY, PH. D., . . *Mineralogy*, . . 1879–1880.
(*Died, March* 25, 1880, *aged* 25 *years*).

MITSURU KUHARA, PH. D., . . *Chemistry*, . . 1879–1881.
Curator of the Scientific Museums, University of Tokio, Japan.

OSCAR H. MITCHELL, PH. D., . . *Mathematics*, . . 1879–1882.
Professor of Mathematics, Marietta College.

EDWARD L. NICHOLS, PH. D., . . *Physics*, . . . 1879–1880.
Professor of Physics and Chemistry, Central University, Richmond, Ky.

WALDO S. PRATT, A. M., . . *Aesthetics, etc.*, . 1879–1880.
Instructor in Ecclesiastical Music, Theological Seminary, Hartford, Conn.

WILLIAM T. SEDGWICK, PH. D., . *Biology*, . . . 1879–1880.
Associate in Biology, Johns Hopkins University.

HERMANN VOORHEES, C. E., . . *Chemistry*, . .
(*Died without entering on the Fellowship, October* 14, 1879, *aged* 27 *years*).

CHARLES O. WHITMAN, PH. D., . *Biology*, . . .
Professor of Zoölogy, University of Tokio, Japan, 1879–81; Marine Station, Naples, 1881–82. (*Resigned*, 1879, *before entering on the Fellowship*).

EDMUND B. WILSON, PH. D., . . *Biology*, . . . 1879–1881.
Assistant in the Biological Laboratory, Johns Hopkins University, 1881–82.

GEORGE F. NICOLASSEN, PH. D., . *Greek*, . . . 1879–1881.
Professor of Greek and Latin, Southwestern Presbyterian University, Tenn.

WILLIAM BURNEY, PH. D., : . *Chemistry*, . . 1879–1880.
Professor of Chemistry, South Carolina College.

ROBERT W. PRENTISS, S. B., . . *Mathematics*, . . 1879–1881.
Office of U. S. Nautical Almanac, Washington, D. C.

JAMES W. BRIGHT, PH. D., . . *Teutonic Languages*, 1880–1882.
Assistant in German, Johns Hopkins University.

BENJAMIN C. BURT, A. M., . . *Philosophy*, . . 1880–1881.
Assistant Professor of English and Rhetoric, University of Michigan.

SPENCER H. FREEMAN, A. M., . . *Physics*, . . . 1880–1882.
Professor of Physics, Adelbert College, Cleveland, Ohio.

KAKICHI MITSUKURI, PH. B., . . *Biology*, . . . 1880–1881.
Lecturer on Zoölogy, University of Tokio, Japan.

BERNARD F. O'CONNOR, B. ÈS LETT., *Romance Languages*, 1880–1882.
Fellow by Courtesy, Johns Hopkins University.

CHASE PALMER, PH. D., . . . *Chemistry*, . . 1880–1882.
Assistant in Chemistry, Massachusetts Institute of Technology, Boston.

HERBERT M. PERRY, A. B., . . *Mathematics*, . . 1880–1882.
New Ipswich, N. H.

WILLIAM L. ROWLAND, S. B., . . *Chemistry*, . .
(*Did not enter upon the Fellowship*, 1880).

EDWARD H. SPIEKER, PH. D., . . *Greek*, . . . 1880–1882.
Assistant in Greek and Latin, Johns Hopkins University.

MORRISON I. SWIFT, A. B., . . *Philosophy*, . . 1880–1882.
Ashtabula, Ohio.

ARTHUR W. WHEELER, A. B., . *Physics*, . . . 1880–1881.
(*Died, January* 6, 1881, *aged* 21 *years*).

R. DORSEY COALE, PH. D., . . *Chemistry*, . . 1880–1881.
Assistant in Chemical Laboratory, Johns Hopkins University.

A. F. WILHELM SCHIMPER, PH. D., *Biology*, . . . 1880–1881.
University of Bonn, Germany.

LAWRENCE B. FLETCHER, PH. D., . *Physics*, . . . 1880–1881.
Instructor in Physics, Wesleyan University, Middletown, Conn.

WILLIAM J. ALEXANDER, A. B., . *Greek*, . . . 1881–

EDWARD S. BURGESS, A. B., . . *Greek*, . . . 1881–1882.
Instructor, Washington (D. C.) High School.

WILLIAM J. COMSTOCK, PH. B., . *Chemistry*, . . 1881–1882.
Student of Chemistry, University of Munich.

WILLIAM C. DAY, A. B., . . . *Chemistry*, . . 1881–

HENRY H. DONALDSON, A. B., . . *Biology*, . . . 1881–

WILLIAM P. DURFEE, A. B., . . *Mathematics*, . . 1881–

GEORGE S. ELY, A. B., . . . *Mathematics*, . . 1881–

J. FRANKLIN JAMESON, PH. D., . *History*, . . . 1881–1882.
Assistant in History, Johns Hopkins University.

C. HERSCHEL KOYL, A. B., . . *Physics*, . . . 1881–

HENRY L. OSBORN, A. B., . . *Biology*, . . . 1881–1882.

HENRY N. STOKES, S. B., . . . *Biology*, . . . 1881–

BENJAMIN W. WELLS, PH. D., . *English*, . . . 1881.
Instructor in English, Friends' School, Providence, R. I. (*Resigned, Oct.*, 1881).

BENJAMIN I. GILMAN, A. M., . . *Logic*, . . . 1881–1882.
Fellow by Courtesy, Johns Hopkins University.

CHARLES J. BELL, A. B., . . . *Chemistry*, . .
Professor of Chemistry, Pennsylvania State College, Center Co., Pa. (*Did not enter upon the Fellowship*, 1882).

JAMES M. CATTELL, A. B., . . *Philosophy*, . . 1882–

ELLERY W. DAVIS, S. B., . . *Mathematics*, . . 1882–

DAVID T. DAY, A. B., . . . *Chemistry*, . . 1882–

ALFRED EMERSON, PH. D., . . *Greek*, . . . 1882–

WILLIAM S. FLEMING, A. B., . . *Greek*, . . . 1882–

ARTHUR L. FROTHINGHAM, . . *Shemitic Languages*, 1882–

HENRY R. GOODNOW, A. B., . . *Physics*, . . . 1882–

ELGIN R. L. GOULD, A. B., . . *History*, . . . 1882–

ARTHUR S. HATHAWAY, S. B., . . *Mathematics*, . . 1882–

WILLIAM H. HOWELL, A. B., . . *Biology*, . . . 1882–

ARTHUR L. KIMBALL, A. B., . . *Physics*, . . . 1882–

HARRY F. REID, A. B., . . . *Physics*, . . . 1882.
Assistant in Physics, Johns Hopkins University.

EDWARD H. KEISER, S. B., . . *Chemistry*, . . 1882–

C.

Graduates.

DEGREES CONFERRED HONORIS CAUSA.

1880.

HENRY A. ROWLAND, PH. D.
Professor of Physics, Johns Hopkins University.

1881.

RUTHERFORD B. HAYES, LL. D.
President of the United States.

DEGREES CONFERRED ON EXAMINATION.

1878.

DOCTORS OF PHILOSOPHY.

HENRY CARTER ADAMS. (F).
A. B., Iowa, 1874.—Lecturer on Political Economy, University of Michigan.

THOMAS CRAIG. (F).
C. E., Lafayette, 1875.—Associate in Mathematics, Johns Hopkins University.

JOSIAH ROYCE. (F).
A. B., Univ. of California, 1875.—Instructor in Philosophy, Harvard University.

ERNEST GOTTLIEB SIHLER. (F).
Concordia, 1869.—Classical Instructor, New York City. (4)

1879.

DOCTORS OF PHILOSOPHY.

MAURICE BLOOMFIELD. (F).
A. M., Furman, 1877.—Associate in Sanskrit, Johns Hopkins University.

SAMUEL FESSENDEN CLARKE. (F).
Ph. B., Yale, 1878.—Professor of Natural History, Williams College.

GEORGE BRUCE HALSTED. (F).
A. B., Princeton, 1875.—Instructor in Post-Graduate Mathematics, Princeton College.

EDWARD HART. (F).
S. B., Lafayette, 1874.—Assistant Professor of Chemistry, Lafayette College.

WILLIAM WHITE JACQUES. (F).
S. B., Mass. Inst. of Technology, 1876.—Electrician, Boston, Mass.

HENRY SEWALL. (F).
S. B., Wesleyan, 1876.—Professor of Physiology, University of Michigan. (6)

BACHELORS OF ARTS.

GEORGE WASHINGTON MCCREARY.
Engaged in mercantile pursuits, Baltimore.

CHASE PALMER. (F).
Assistant in Chemistry, Massachusetts Institute of Technology.

EDWARD HENRY SPIEKER. (F).
Assistant in Greek and Latin, Johns Hopkins University. (3)

F. Holders of Fellowships.

1880.

DOCTORS OF PHILOSOPHY.

FRANCIS GREENLEAF ALLINSON. (F).
A. B., Haverford, 1876: A. B., Harvard, 1877.—Late Assistant Professor of Greek and Latin, Haverford College; Classical Instructor, Baltimore.

FABIAN FRANKLIN. (F).
Ph. B., Columbian, 1869.—Associate in Mathematics, Johns Hopkins University.

EDWIN HERBERT HALL. (F).
A. B., Bowdoin, 1875.—Instructor in Physics, Harvard University.

ALLAN MARQUAND. (F).
A. B., Princeton, 1874.—Lecturer on Logic, etc., Princeton College.

WASHINGTON IRVING STRINGHAM. (F).
A. B., Harvard, 1877.—Professor of Mathematics, University of California. (5)

BACHELORS OF ARTS.

THOMAS MILTON BEADENKOPF.
Assistant, Library of Peabody Institute, Baltimore.

ALLEN KERR BOND.
M. D., University of Maryland, 1882.—Physician, Baltimore.

WILLIAM CATHCART DAY. (F).
Fellow, Johns Hopkins University.

HENRY LAURENCE GANTT.
Instructor, McDonogh School.

EDGAR GOODMAN.
LL. B., University of Maryland, 1881.—Attorney at Law, Baltimore.

CARL ECKHARDT GRAMMER.
Student of Theology, Virginia Theological Seminary.

ALEXANDER FRIDGE JAMIESON.
Instructor, Trenton, N. J.

EDMUND ALLEN JARVIS.
Died, October 15, 1880, aged 22 years.

STEWART BRIAN LINTHICUM.
LL. B., University of Maryland, 1882.—Attorney at Law, Baltimore.

JOHN HANSON LOWE.
LL. B., University of Maryland, 1882.—Attorney at Law, Baltimore.

LEIGH CLINTON MORGAN.
Clergyman, Bunker Hill, W. Va.

NELSON PALMER.
Baltimore.

THOMAS PETTIGREW.
Creswell, N. C.

HARRY FIELDING REID. (F).
Assistant in Physics, Johns Hopkins University.

WILTZ RAYMOND STRICKLEN.
Clergyman, Arlington, Md.

LEWIS WEBB WILHELM.
Graduate Scholar, Johns Hopkins University. (16)

1881.

DOCTORS OF PHILOSOPHY.

LOUIS BEVIER. (F).
A. B., Rutgers, 1878.—Student of Philology, University of Bonn.

ROBERT DORSEY COALE. (F).
Assistant in Chemistry, Johns Hopkins University.

EDWARD ALLEN FAY.
A. B., University of Michigan, 1862.—Professor of History and Languages, National Deaf-Mute College.

LAWRENCE BUNTING FLETCHER. (F).
A. B., Columbia, 1877.—Instructor in Physics, Wesleyan University.

SAMUEL GARNER.
A. B., St. Johns, 1871.—Professor of Modern Languages, University of Indiana.

EDWARD MUSSEY HARTWELL. (F).
A. B., Amherst, 1873; M. D., Miami Medical College, 1882.—Physician, Cincinnati, O.

WILLIAM THOMPSON SEDGWICK. (F).
Ph. B., Yale, 1877.—Associate in Biology, Johns Hopkins University.

CHRISTIAN SIHLER. (F).
Concordia, 1866.—Physician, Cleveland, O.

EDMUND BEECHER WILSON. (F).
Ph. B., Yale, 1878.—Late Assistant in Biology, Johns Hopkins University. (9)

BACHELORS OF ARTS.

WILLIAM WILSON BADEN.
Student of Law, University of Maryland.

HENRY JOHNS BOWDOIN.
Student of Law, University of Maryland.

JOHN WILSON BROWN.
Baltimore.

DAVID TALBOTT DAY. (F).
Fellow, Johns Hopkins University.

WILLIAM HENRY HOWELL. (F).
Fellow, Johns Hopkins University.

JOHN JOHNSON.
Instructor, McDonogh School.

JAMES EDWARD KEELER.
Assistant, Allegheny (Pa.) Astronomical Observatory.

EDWIN GEORGE RICHARDSON.
Clergyman, Newark, N. J.

ADONIRAM JUDSON ROBINSON.
Graduate Student, Johns Hopkins University.

HENRY ROLANDO.
Student of Medicine, University of Maryland.

LEE SALE.
Student of Law, Louisville, Ky.

MACTIER WARFIELD.
Student of Medicine, University of Maryland. (12)

1882.

DOCTORS OF PHILOSOPHY.

JAMES WILSON BRIGHT. (F).
A. B., Lafayette, 1877.—Assistant in German, Johns Hopkins University.

JOHN FRANKLIN JAMESON. (F).
A. B., Amherst, 1879.—Assistant in History, Johns Hopkins University.

MITSURU KUHARA. (F).
S. B., University of Tokio, 1877.—Curator of the Museums, University of Tokio.

ROBERT W. MAHON.
C. E., Lehigh, 1876.—Tutor in Chemistry, Lafayette College.

OSCAR HOWARD MITCHELL. (F).
A. B., Marietta, 1875.—Professor of Mathematics, Marietta College.

GEORGE FREDERICK NICOLASSEN. (F).
A. B., University of Virginia, 1879.—Professor of Ancient Languages, Southwestern Presbyterian University.

WILLIAM ALBERT NOYES.
A. B., Iowa, 1879.—Assistant Professor of Chemistry, University of Minnesota.

CHASE PALMER. (F).
A. B., Johns Hopkins, 1879.—Assistant in Chemistry, Mass. Institute of Technology.

EDWARD HENRY SPIEKER. (F).
A. B., Johns Hopkins, 1879.—Assistant in Greek and Latin, Johns Hopkins University. (9)

BACHELORS OF ARTS.

WILLIAM HUGHLETT ADKINS.
Student of Law, University of Maryland.

THOMAS ALEXIS BERRY.
Pursuing his studies in Germany.

GUSTAV BISSING.
Graduate Scholar, Johns Hopkins University.

WALTER BERNARD CLARKSON.
Principal, Duval High School, Jacksonville, Fla.

HERMANN LOUIS EBELING.
Instructor, Bloomfield, N. J.

LOUIS GARTHE.
Graduate Student, Johns Hopkins University.

EDWARD INGLE.
Graduate Student, Johns Hopkins University.

RICHARD FULLER KIMBALL.
Student of Law, University of Maryland.

GUSTAV ADOLPH LIEBIG, JR.
Graduate Student, Johns Hopkins University.

CHARLES WILLIAM EMIL MILLER.
Graduate Scholar, Johns Hopkins University.

JAMES PAGE.
Graduate Student, Johns Hopkins University.

ALBERT GALLATIN PALMER.
Graduate Student, Johns Hopkins University.

ROBERT MILLER REESE.
Baltimore.

LEWIS TEBBETTS STEVENS.
Graduate Scholar, Johns Hopkins University.

HERBERT THORNDYKE TIFFANY.
Graduate Student, Johns Hopkins University. (15)

TOTAL (1878-82.)

DOCTORS OF PHILOSOPHY,	33
BACHELORS OF ARTS,	46

D.

System of Fellowships.

Twenty fellowships are annually open to competition in this university, each yielding five hundred dollars and exempting the holder from all charges for tuition.

OBJECT OF THE FOUNDATION.

The system of fellowships was instituted for the purpose of affording to young men of talent from any place an opportunity of continuing their studies in the Johns Hopkins University, while looking forward to positions as professors, teachers, and investigators, or to other literary and scientific vocations. The appointments have not been made as rewards for good work already done, but as aids and incentives to good work in the future; in other words, the fellowships are not so much honors and prizes bestowed for past achievements, as helps to further progress, and stepping stones to honorable intellectual careers. They have not been offered to those who are definitely looking forward to the practice of either of the three learned professions (though such persons have not been formally excluded from the competition), but have been bestowed almost exclusively on young men desirous of becoming teachers of science and literature, or proposing to devote their lives to special branches of learning which lie outside of the ordinary studies of the lawyer, the physician, and the minister.

Every candidate is expected to submit his college diploma or other certificate of proficiency from the institution where he has been taught, with recommendations from those who are qualified to speak of his character and attainments. But this is only introductory. He must also submit, orally or in writing, such evidence of his past success in study, and of his plans for the future, together with such examples of his literary or scientific work, as will enable the professors to judge of his fitness for the post. The examination is indeed in a certain sense competitive; but not with uniform tests, nor by formal questions submitted to the candidates. First, the head of a given department considers, with such counsel as he may command, the applicant's record. The professors then collectively deliberate on the nominations made by individual members of their body. The list upon which they agree, with the reasons for it, is finally submitted by the president of the university to the executive committee, and by them to the trustees for final registration and appointment. By all these precautions, the highest results which were anticipated have been secured. A company of most promising students has been brought together, and their ability as teachers and scholars has been recognized by the calls they have received to permanent and desirable posts in different parts of the country.

The number of applications for fellowships has hitherto been very large, and it may have happened that some candidates have failed of appointment who were really superior to those selected. But, if so, this has resulted from the fact, that a considerable number of applicants have each year forwarded to the university merely testimonials from their instructors without any such examples of their own work as have been mentioned above; and in consequence, the professors, from want of adequate knowledge, have been compelled to pass over candidates who may have been in the highest degree meritorious.

It is obvious from the nature of the case that graduate students residing in Baltimore must have better opportunities than others of making known their powers to the appointing board; but the absence of candidates from Baltimore has been no bar to their appointment, in cases where adequate evidence of their claims has been presented.

Regulations.

1. The application must be made in writing.

2. The candidate must give evidence of a liberal education, such as the diploma of a college of good repute; of decided proclivity towards a special line of study, such as an example of some scientific or literary work already performed; and of upright character, such as a testimonial from some instructor.

3. The value of each fellowship will be five hundred dollars. In case of resignation, promotion, or other withdrawal from the fellowship, payments will be made for the time during which the office shall have been actually held.

4. Every holder of a fellowship will be expected to render some services to the institution as an examiner, to give all his influence for the promotion of scholarship and good order, and in general to co-operate in upholding the efficiency of the university, as circumstances may suggest. He must reside in Baltimore, during the academic year.

5. He will be expected to devote his time to the prosecution of special study (not professional), with the approval of the president, and before the close of the year, to give evidence of progress by the preparation of a thesis, the completion of a research, the delivery of a lecture, or by some other method.

6. He may give instruction, with the approval of the president, by lectures or otherwise, to persons connected with the university, but he may not engage in teaching elsewhere.

7. He may be re-appointed at the end of the year.

8. The appointments are usually made as follows:

In mathematics, three; chemistry, three; physics, three; biology, three; Greek, three; other subjects, five.

9. *Applications for the next year should reach the university before May* 11, 1883.

E.

The Johns Hopkins University as a Place for College Students.

[Reprint of a University Circular, issued May 12, 1882, referred to at page 11].

The Johns Hopkins University invites the attention of the residents of Maryland and of the adjacent region, and especially of the citizens of Baltimore, to the opportunities here afforded for acquiring a college training.

The reputation which the university has gained at a distance, as well as at home, by the work which its teachers have done in the advancement of science, and by the publications which it has encouraged, diverts the attention of casual observers from the advantages offered in its collegiate instruction. Even the public lectures given by resident and non-resident professors, have been so generously reported in the newspapers, that they sometimes appear as the principal work, and not in their true aspect as courses auxiliary and subordinate to the ordinary instruction.

The trustees have always been mindful that they were to maintain a university for the advanced education of youth fitted for such higher training, and they have been gratified to observe how soon the advantages here offered were appreciated in distant regions by young men who have come to Baltimore in considerable numbers for the prosecution of their studies.

But from the beginning, the authorities have held to the belief that university instruction depends upon collegiate; and that a good university must either include a college, or must be so placed that it can influence and attract the students of colleges independently maintained. Some generous person, desiring to add still greater attractions to the city for which Peabody, Hopkins, and Pratt have done so much, might well endow a college for young men, another might endow a college for young women,—and both such foundations, whether affiliated with the Johns Hopkins University, or independent of it, might derive extraordinary advantages from its neighborhood, and from the professors, the collections, the laboratories, and the other agencies which the university will provide.

At present, however, this university, in addition to what it offers to graduates and others who are prepared for advanced study, maintains instruction for undergraduate students, candidates for the customary degree of bachelor of arts. While admitting that there are advantages offered by older institutions which cannot at once be provided in a new place, we may claim that there are other advantages which this institution possesses in its freedom from restrictions, in its ample funds, and in its readiness to adopt those regulations which the experience of older institutions has proved to be desirable, though they are not always practicable where routine and usage have long prevailed.

Let us consider some of these points. Of late years, there has been a great deal of discussion respecting the proper plan of study to be recommended to young men who seek a liberal education. Much can be said in favor of prescribing one course to be followed by all who look towards the baccalaureate degree. Usage is in its favor; so is economy; so is the testimony of many wise men who have had this training and who know its value. On the other hand, the number of modern sciences which call for recognition is so large, and the attainments exacted by the various callings of modern society are so numerous and diverse, that it is really a difficult matter to decide between conflicting claims. In some places, freedom of choice on the part of every student is permitted; elsewhere, some of the studies are required of all students and others are optional,—the extent to which option is allowed varying very much; in other places scientific colleges are maintained by the side of classical colleges; and again there are institutions which continue to allow no choice whatever and provide but one course for all.

The plan adopted in Baltimore is this. No distinction is made between the scientific departments and what has elsewhere been called "the college proper"; all the courses lead to one and the same degree (bachelor of arts) and are intended to be equally difficult, and to require an equal amount of time. The standard of matriculation, alike for all students, is somewhat higher than is common in American colleges, in order that as much as possible of preliminary discipline may be acquired in the preparatory schools. But this training can be readily obtained in the best schools of Baltimore, or with private resident teachers. All who

desire to take an academic degree are expected "to matriculate." After doing so, they have some degree of choice but not absolute freedom. In accordance with parental advice and with the counsel of a member of the faculty who acts as an Adviser, every student must decide upon one of several combinations of study which are offered to him. The combinations may be named as follows: I. Classical; II. Mathematical; III. Literary; IV. Scientific; V. Preliminary to Medicine; VI. Preliminary to Theology; VII. Preliminary to Law.

The dominant character of each course may be inferred from its designation, but a more definite notion can be acquired from the official register, which is annually published. Without repeating the details, it may be said that the scholar who successfully goes through any one of these combinations of study should during its progress have shown that he has at least the usual collegiate proficiency in algebra, geometry, trigonometry, and analytical geometry; in English, French, German, Latin, and Greek (unless excused in the last named subject to gain more time for scientific studies); physics or chemistry or both; and in some branches of history and philosophy.

The time required to complete any of these courses may be three or four years; or it may be less if the student comes with attainments beyond what are demanded for matriculation, or if he is favored by the possession of unusual ability. He is not kept back by the ordinary class-system. He proceeds at a slower or a more rapid rate according to circumstances.

It is obvious that to give efficiency to these arrangements a large staff of teachers is requisite. There are at present not less than twenty-seven who take some part in the instruction of undergraduate students, and as the teaching staff is large in proportion to the number to be taught, the scholars have a corresponding advantage. They are individually well known to their instructors and are brought into familiar relations with them, so that their various intellectual needs secure personal attention.

The presence of a company of older and more advanced students in the university exerts a strong influence upon under-graduates. The whole establishment becomes a laboratory where every body is busy, and where enthusiasm in study is the predominant characteristic. Minute regulations are not often called for,

because the interest awakened in pursuits which the scholar himself has chosen, secures application and industry on the part of nearly all; and the few who are indifferent to the advantages afforded them soon drop out of the ranks.

Personal acquaintance with one and another advanced student leaving our halls to assume a position of usefulness and honor, acts as a powerful stimulant upon those who are still in an earlier stage of discipline. They see what results follow devotion to study. Moreover the graduate students come from widely different regions, tending to make this university a national institution; so that, while its aggregate attendance is not as yet very large, it includes men of diverse antecedents, training, and expectations, and leads to that knowledge of human nature and of civil society which comes from an acquaintance with men of widely different circumstances. The poor and the rich, the city boy and the country boy, the foreigner and the native, the quick and the slow, the lover of books and the lover of experiment, are brought together in the same class rooms, laboratories, and societies, in walks, in sports, in religious and charitable duties, and in all the associations of academic life.

Professor Dunbar, Dean of the Harvard Faculty, recently made the following remark in respect to the influence of university students upon those of a college:

. . . ."All students in College, it is believed, feel the effect of a more stimulating intellectual atmosphere, created by the presence and example of persons engaged in the highest pursuits. Both as regards the intellectual activity of students and the quality of the instructing body, the vigorous life of the *College* hereafter is to be promoted most effectively by the building up of a broad and solid structure of *University* work."

A still stronger, though perhaps a less obvious influence is exerted upon collegiate students by the certainty that their teachers are known in the world at large as contributors to the advancement of knowledge. The presence of a renowned professor is felt beyond the limited circle of those who follow his appointed lectures. All members of the university are influenced by his methods of investigation and by his publications, and they almost feel entitled to share in the honors which he gains.

Among the minor usages which has found favor in this university is the employment of paid examiners, (who have had no part in

the instruction of the classes), to set papers and mark the answers in special branches of study. The teacher also examines his class,—but when a second paper is set by the university examiner, the scholar is aware that his attainments are to be tested by two standards,—that of his instructor, with whose methods he is of course familiar, and that of another judge whose lessons he has never followed. The trial is severe, but its disciplinary influence is good.

Again, the private reading of standard and classical authors is encouraged by the instructors in ancient and modern languages, history, philosophy, etc.;—and examinations are held from time to time in order that the scholar may receive credit on the record books of the university for work which is thus carried on independently of the class-room recitations. Such reading is often found profitable in the long vacation of summer. A wider acquaintance with good writers may thus be attained than it is possible to secure in the ordinary limitations of a class; individual tastes may to some extent be followed in the selection of books, and a degree of proficiency may be acquired which will tend to give the student more opportunity, in term time, for work which can only be done in a laboratory or under a teacher's eye.

There is one of the combination of studies above referred to which calls for a few special words of comment,—the group preliminary to medical studies. Opportunities are here afforded to a young man, who expects at a later day to take up the study of medicine, to become proficient in laboratory work while acquiring a knowledge of German and French and continuing his general education. A course is arranged in which physics for the first year, chemistry for the second, and the biological study of plants and animals for the third year, are the dominant topics. At the close of this course the student should have become proficient in a knowledge of the physical and chemical laws which underlie the conditions of life; he should have become familiar with the structure and functions of living beings in their normal and healthy condition; he should have become skilful in the use of the microscope and other physiological apparatus; and so when he enters the school of medicine he should know that he has been well prepared for the study of disease and of its treatment, by a training in fundamental sciences, which has not only exercised his eye and

hand but has accustomed his mind to accurate habits of observation and inquiry.

This combination of studies is recommended to students after passing the full matriculation examination,—but it has so long been customary in this country for the medical colleges to receive students without requiring of them any preliminary examination whatsoever, that for a time it is thought best to receive to this course of preliminary training students who are not at their admission prepared for the full matriculation. A special examination is therefore appointed for such as wish to enter upon a three years course of scientific studies, without expecting to take the degree of bachelor of arts.

The authorities of the university are mindful that there are many persons in Baltimore who desire to avail themselves to a certain extent of the advantages of a university without becoming fully matriculated students or candidates for a degree. So far as it is possible without interfering with the requirements of regular students and with the necessary engagements of the professors, the effort has been made to extend the university influence in this community, by lectures given in Hopkins Hall, by teachers' classes, and by occasional courses in different parts of the city. It may not be as well known that students who can give good evidence of being fitted to profit by the lessons here given are permitted to receive instruction in those branches which they are ready to pursue. There is an obvious danger in this permission, against which the faculty must be on its guard. A youth is often disposed to avoid that which seems to him "hard," and to choose an easy path; or, sometimes, he only cares to be enrolled in a respectable college without having any desire to study. It is not for such cases that this permission is designed. Nor is it intended to imply that, as a general rule, the study of one or two subjects is the proper way of acquiring a liberal education. Nevertheless, experience shows that there are in every community some who are not able, for one reason or another, to pursue a prolonged and systematical plan of instruction, but who have decided talents and are disposed to make good attainments in a more limited sphere. To such as these the door of the Johns Hopkins University has never been closed; indeed, among the students of this class, many young men of excellent ability and promise have been found,

and some who began as "special students" have afterwards matriculated and graduated with honor.

The charges for tuition are lower than is customary in institutions of corresponding rank, being forty dollars for each half year. The only additional fees are those required in the laboratories for materials consumed. The founder of the university requested that scholarships should be awarded to young men from Maryland, Virginia, and North Carolina who are found worthy, and accordingly such scholarships yielding free tuition are annually open to those who wish for this aid in the prosecution of their studies. Seventy persons have already enjoyed this advantage. The trustees have extended this privilege to residents of the District of Columbia.

Parents at a distance are sometimes afraid to send their sons to a city. If they will take the pains to inquire they will ascertain that most of the temptations to which youth are exposed may be found in the neighborhood of country colleges as well as in large towns. Wherever young men are congregated they need to be on their guard against open as well as insidious allurements by which their physical, intellectual, and moral natures may be impaired for life; and every right-minded teacher must feel the responsibility of guiding those who come under his influence in the paths of rectitude. But the arrangements of the Johns Hopkins University are favorable to good conduct. The students dwell in families resident in widely separated parts of the city. They are governed by the social, moral, and religious influences of the homes to which they belong. While assembled in the university they are brought into constant relations with their teachers. An attractive library is open to them without interruption all the day long. There are gymnasiums, not very far distant, to which they may resort for physical culture and entertainment. There are numerous societies and clubs to many of which the teachers belong. All these circumstances have been favorable, it is believed, not only to the preservation of good order, but to the formation of good habits.

The Johns Hopkins University is an unsectarian foundation. Like the city in which it is placed, it includes among its members those whose opinions and beliefs are widely divergent. But it is not an irreligious foundation because it assumes no distinctive

name. It inculcates the love of truth, not only in the daily relations of man to man, but in the defence of opinions, in the prosecution of research, and in the formation of mental habits. It insists upon uprightness of conduct in all its members. Yet in accordance with the usages of other well known colleges, which commonly bear denominational names, it lays down no test or creed for the assent of students or professors. The trustees have expressed a desire to see the university pervaded by a spirit of enlightened Christianity; the ethics taught is Christian ethics; the daily religious service is Christian worship; but the abundance and diversity of churches in this community make it quite inexpedient for the university to become identified with any one religious body. Its officers and students are of many denominations, and maintain the relations which their own consciences approve.

The number of students from Baltimore who have availed themselves of the privileges of the Johns Hopkins University is two hundred and four. Of this number, sixty-nine entered as graduate students, sixty-nine have followed courses as matriculates, and sixty-six as undergraduate special students. Twenty-nine of the matriculates have already gone forward to the degree of bachelor of arts after passing the requisite examinations.

A considerable number of these recent graduates still remain here and are pursuing their studies in languages, science, history, etc., in order that they may be fitted for the degree of doctor of philosophy, for which they can become candidates; or that they may be better qualified for the professional studies which they expect to take up. Four who were undergraduates a few years ago have already been appointed fellows, which is the highest honor bestowed by the university upon a student. Others have entered upon the professional study of law, medicine, or theology, and others are engaged in teaching or in business.

F.

List of Foreign Correspondents.

The following list gives the names of the foreign societies and journals with which a regular exchange of publications is made by the university. (See page 69).

GERMANY AND AUSTRIA.

Berlin. Königliche akademie der wissenschaften.
Deutsche chemische gesellschaft.
Jahrbuch über die fortschritte der mathematik.
Journal für reine und angewandte mathematik. (Crelle.)
Cassel. Verein für naturkunde.
Cöthen. Chemiker zeitung.
Giessen. Jahresbericht über die chemie und physik.
Göttingen. Königliche gesellschaft der wissenschaften.
Heilbronn. Literaturblatt f. germ. u. rom. philologie.
Jena. Jenaische zeitschrift für naturwissenschaften.
Leipzig. K. Sächsische gesellschaft der wissenschaften.
Archiv der mathematik und physik. (Grunert.)
Jahrbücher f. classische philologie.
Liebig's annalen der chemie. (Wöhler, Kopp.)
Mathematische annalen. (Clebsch.)
Zeitschrift für mathematik und physik. (Schlömilch.)
Zeitschrift für krystallographie und mineralogie.
Zoölogischer anzeiger.
Munich. Königliche akademie der wissenschaften.
Strassburg. Zeitschrift für physiologische chemie.
Trieste. Κλείω.
Tübingen. Jahresbericht für reine chemie.
Vienna. K,-k. akademie der wissenschaften.
Wiesbaden. Zeitschrift für analytische chemie. (Fresenius.)

FRANCE AND SWITZERLAND.

Cherbourg. Société nationale des sciences naturelles et mathématiques.
Paris. Institut de France: Académie des sciences.
Bureau des longitudes.
École normale superieure.
École polytechnique.
Observatoire de Paris.
Société chimique de Paris.
Société mathématique de France.
Annales de chimie et de physique.
L'astronomie.
Bulletin des sciences mathématiques et astronomiques.
Journal de mathématiques pures et appliquées.
Nouvelles annales de mathématique.
Revue internationale de l'enseignement.
Revue politique et littéraire.
Revue scientifique.

Bern. Schweiz. gesellsch. für die gesammten naturwissenschaften.
Zurich. Société helvétique des sciences naturelles.

Belgium and Holland.

Brussels. Académie des sciences de belgique.
Annales du bibliophile.
Ghent. Mathésis.
Archives de biologie.
Leyden. Nederlandsche dierkundige vereeniging.
Récueil des travaux chimiques des Pays-Bas.
Liége. Société royale des sciences.
Louvain. Le muséon.

Italy; Spain and Portugal.

Milan. Istituto Lombardo di scienze e lettere.
Annali di matematica pura ed applicata.
Naples. Giornale di mathematiche.
Zoologische station zu Neapel.
Palermo. Gazzetta chimica Italiana.
Rome. Reale accademia dei lincei.
Turin. Reale accademia delle scienze.
Archives Italiennes de biologie.
Venice. Reale istituto Veneto.

Coimbra. Jornal de sciencias mathematicas e astronomicas.
Madrid. Novedades cientificas.

Great Britain and Ireland.

Cambridge. Philosophical society.
Dublin. Trinity college.
Edinburgh. Royal society.
London. Royal society.
Royal astronomical society.
Mathematical society.
Chemical society.
Society of telegraph engineers.
Royal institution of Great Britain.
Society of chemical industry.
Chemical news.

Denmark and Norway; Russia and Finland.

Copenhagen. Royal academy.
Tidsskrift for mathematik.
Christiania. Archiv for mathematik og naturvidenskab.
University of Christiania, publications.

St. Petersburg. Académie impériale des sciences.
Helsingfors. Société des sciences de la Finlande.

Greece.

Athens. Παρνασσός.

British India.

Calcutta. Asiatic society of Bengal.

Japan.

Tokio. University, publications of scientific department.

Australia.

Sydney. Royal society of New South Wales.

Mexico.

Mexico. Revista cientifica Mexicana.

Brazil.

Rio de Janeiro. Observatoire impériale.

G.

Report of the Chesapeake Zoölogical Laboratory.

FOR THE FIFTH YEAR.

Summer of 1882, Beaufort, N. C.

To the President of the Johns Hopkins University:

DEAR SIR: In accordance with your request, I have the pleasure to submit the following report of the fifth session of the Chesapeake Zoölogical Laboratory.

The laboratory was opened for work at Beaufort, N. C., on May 1, 1882, and was closed on September 29, after a session of twenty-two weeks.

The following is a list of the scientific workers of the party:

W. K. BROOKS, *Director.*
E. B. Wilson, *Assistant.*
H. L. Osborn, *Fellow J. H. U.*
H. W. Conn, *Graduate Student J. H. U.*
J. M. Tyler, *Prof. of Natural Science, Amherst College.*
J. Pillsbury, *Prof. of Natural Science, Springfield, Mass.*
J. M. Wilson, M.D., *Ann Arbor, Mich.*
Francis Winslow, *Lieut. U. S. N., U. S. Fish Commission.*

Abstracts of the more important investigations have already been printed in the University Circulars, and in the Zoölogischer Anzeiger, and more extended accounts are now in preparation for publication.

The following subjects, among others, have been investigated:

Dr. E. B. Wilson has completed his study of the anatomy, histology, and embryology of Renilla, and I hope that his paper on this subject will soon be published. The work has fully occupied him and Prof. Mitsukuri for three years, and his results, which are of the greatest interest to science, cover so much ground that it is impossible to state them here. He was able this summer to fill all the gaps in his previous work, since he succeeded in obtaining an ample supply of material.

He also obtained the eggs and young of a closely allied form, Leptogorgia, and, by tracing its life history, secured the data for a comparison between Renilla and other compound polyps. As the great number and cost of the engravings render the publication of this paper in this country almost impossible, Dr. Wilson has taken his specimens and drawings to Europe, in order to find means for publication there. He also hopes to complete his work by studying, in the Naples Aquarium, the embryology of Pennatula, a form which can only be obtained on our coast by deep-sea dredging.

Incidentally to this work, Dr. Wilson has published this summer a paper on "Variation in the Early Stages of the Development of Renilla," a subject which he investigated this season, with the help of J. M. Wilson and H. L. Osborn.

Lieut. Winslow and I devoted nearly two months to oyster propagation, and made discoveries which enable us to rear oysters from the egg much more rapidly and with greater certainty than has been possible before; and although we have not yet succeeded in keeping the young oysters until they attach themselves, our experience this year will enable us to construct an apparatus which we have every reason to believe will accomplish this purpose. Our station at Beaufort is so remote from all mechanical resources and appliances that we were not able to construct this apparatus; but we hope to be able to take it with us and put it into operation early next spring.

Mr. Osborn has studied the growth of the shell of the oyster by placing small circles of microscopic glass between the mantle and the shell of the living oyster, and removing them at short intervals to examine the manner in which the new shell is deposited on the glass. He has also been able to make interesting observations upon the rate of growth of the oyster.

His researches on this subject show that, within six weeks after it attaches itself, the oyster may, under favorable circumstances, grow to the length of an inch, or even more. The oysters upon which he experimented were not reared from the egg, but were caught in the open water by a spat-collector.

Mr. Osborn has also studied the anatomy of Balanoglossus, and he expects to continue this work through the winter in Baltimore.

Mr. Conn spent most of the summer tracing the life histories of crabs, and obtained many novel and interesting results.

He also studied the development of the embryo of Tubularia (Parypha) cristata, and has an illustrated paper on this subject now ready for publication. His researches show that the published accounts of the embryology of Tubularian hydroids are incorrect.

Mr. Conn has also demonstrated, by feeding with colored particles, the occurrence of intra-cellular digestion in Tubularia.

He has also made a very thorough study of the embryology of a Gephyrean worm, Thallassima, but another season at the sea-shore will be necessary to complete this work.

Dr. J. M. Wilson has carried on a series of experiments to test the statement that the eggs of Sea-Urchins may develop parthenogenetically, and his results seem to show that the statement is untrustworthy.

My own chief work has been the study of the hydro-medusae of Beaufort, and a monograph on this subject is now in preparation.

I have added a number of new forms to my list this summer, and have traced the life histories of several others. I have also verified Metsch-

nickoff's account of the delamination of the egg of Liriope; and McCrady's account of the development of the parasitic larva of Cunina within the bell of Turritopsis.

As regards my work on the Macroura of Beaufort, I have added a number of new facts, and now have ready for publication an account of the life history of Alpheus minus; an account of Alpheus heterochelis; and of Penaeus Braziliensis. The latter is of especial interest, since I have been able to verify, by actually rearing captive isolated specimens, Fritz Müller's classical memoir on this subject.

Among the more interesting new forms which we have added this year to the fauna of our continent, I may mention Pedicellina and Loxosoma.

Yours respectfully,

W. K. BROOKS.

H.

List of Donors to the Library, September 1, 1881, to September 1, 1882.

ARCHAEOL. INST. OF AMERICA. Papers. Classical Series I. Boston. O.
BRINTON, D. G., M.D. (Author). Books of Chilan Balam. Philadelphia. O.
BRANDT, H. G. C. Preussische Siegeslieder. Heilbronn. D.
BLAKE, E. W. (Author). Solution of the Pyramid Problem. New York. O.
BALLARD, R. (Author). Aerodynamics. New Haven. O.
CORDELL, E. F., M. D. Transactions of Medical and Chirurgical Faculty of Maryland. Baltimore. O.
CENTURY Co. Selected proofs from Scribner's Monthly. New York. F.
CARPENTER, PROF. W. H. (Editor). Nikolasdrapa Halls Prests. Halle. O.
Olafsson, A. Authfrædi. Copenhagen. O.
Olafsson, A. Skirnir. Copenhagen. O.
COOK, G. H., State Geologist, N. J. Annual Report, 1881. Trenton. O.
CASEY, J. (Author). Sequel to the First Six Books of Euclid. London. D.
COMMISSIONERS OF PUBLIC SCHOOLS. Baltimore. Report for 1881. Baltimore. O.
COMEGYS, J. P. (Author). Memoir of J. M. Clayton. Wilmington. O.
CONVERSE, J. H. Subject Index to Library of Baltimore Bar. Baltimore. O.
DALLAS, E. J. (Compiler). Street Directory of Principal Cities of the United States. Washington. O.
DENNY, H. G. Massachusetts State Record. 5 Vols. Boston. O.
EYRE AND SPOTTISWOODE. (Publishers). Variorum Teacher's Bible. London. O.
ELY, R T. Statistisches Jahrbuch d. Stadt Berlin. Berlin. O.
GILMAN, PREST., D. C. Boerhaave Aphorismi. Leyden. D.
GREEN, S. A., M. D. Reports, Record Commissioners of Boston. 4 Vols. Boston. O.
JEROME, GOV., D. H. Geological Survey of Michigan. Vol. IV. New York. O.
MARTIN, PROF. H. N. (Author). Handbook of Vertebrate Dissection. New York. D.

McDANOLDS, J. S. New Jersey Archives. 4 Vols. O.
MORRIS, PROF. C. D. Milton's Paradise Lost. Edited by R. Bentley. London. Q.
MASON, REV. P. A. (Author). Hebrew Grammar. Cambridge. O.
Hebrew Exercise Book. Cambridge. O.
Shemets Davar. Cambridge. O.
NICHOLSON, J. W. (Author). The Multisector and Polyode. New Orleans. O.
NORWEGIAN GOVERNMENT. Norske Nordhavs-Expedition, General Report, 1876–1878: Chemi, H. Tornoe; Zoologi: Fiske, R. Collett; Gephyrea, D. C. Danielssen og J. Koren. Christiania, 1880–81. Q
PAUL, A. G., Lieutenant U. S. N. Instructions to Lighthouse Keepers. Washington. Q.
Reynaud. Memoir on Illumination and Beaconage on the Coast of France. Washington. Q.
PUBLISHERS OF THE DIPLOMATIC REVIEW. Complete set of the Diplomatic Review. Collection of historical publications of D. Urquhart. London.
PFEIFFER, MRS. EMILY. (Author). Under the Aspens. London. D.
STERETT, J. R. S. (Editor). Hymni Homerici. Boston. D.
SMITHSONIAN INSTITUTION. First Annual Report of the Bureau of Ethnology. Washington. Q.
SYLVESTER, PROF. J. J. U. S. Astronomical Observations for 1877. Washington. Q.
SELWYN, A. C., Director of Geological Survey of Canada. Report of Progress of Geological Survey. Montreal. O.
SCUDDER, S. H. (Author). Archipolypoda. Boston. Q.
Anatomy of Lepidoptera. Cambridge. D.
SMYTH, C. PIAZZI., Royal Astronomer of Scotland. (Author). Madeira Meteorologic. Edinburgh. O.
TRUSTEES OF THE LATE G. HENNY. Aeneidea. Vol. III., 2. Dublin. O.
TRUSTEES OF PEABODY EDUCATION FUND. Proceedings. Vol. II. Boston. O.
UNIVERSITY OF CHRISTIANIA, NORWAY. Collection of scientific treatises. O. and Q.
WYATT, J. NOEL. 34 vols. of valuable French books.
WALLIS, S. TEACKLE. Valbuena, M., Latin-Spanish and Spanish-Latin Dictionary. Madrid. T.
U. S. GOVERNMENT PUBLICATIONS.

Besides valuable pamphlets from:
Duggan, J. R.; Scudder, S.; Van Bibber, W. C., M.D.; Watson, Rev. R. B.; Gore, G.

I.

Bibliographia Hopkinsiensis.

1876-1882.

The following list includes books and articles published by members of the Johns Hopkins University, written during the connection of the author with the university, or based on work carried on while here. Other papers written by holders of Fellowships are also given. The graduating theses of the doctors of philosophy are also included.

The work of non-resident lecturers is not included.

The journals, etc., issued under the auspices or with the aid of the university, are indicated in the list by the following abbreviations:

American Journal of Mathematics, - - -	*Math. Jour.*
American Chemical Journal, - - - -	*Chem. Jour.*
American Journal of Philology, - - - -	*Philol. Jour.*
Studies from the Biological Laboratory, - -	*Biol. Studies.*
Journal of Physiology, - - - - - -	*Jour. of Physiol.*
Contributions to Logic, - - - - - -	*Logical Contributions.*
Studies in Historical and Political Science, - -	*Hist. and Pol. Studies.*
Johns Hopkins University Circulars, - - -	*Univ. Circulars.*

Where an article has appeared in more than one of the journals above named, its principal place of publication alone is generally given. As a full index of the abstracts of scientific papers in the University Circulars has recently appeared, only a portion of the papers there published are here noted.

ADAMS, H. B.

Maryland's influence in founding a national commonwealth, embracing two minor papers on Washington's land speculations and Washington's public spirit in opening a channel of trade between the East and the West. (*Maryland Historical Society, Fund Publication, No.* 11, 1877).

Translation of Bluntschli's essay on the service of Francis Lieber to political science and international law. (*International Review, Jan.*, 1880; *reprinted in Lieber's Miscellaneous Writings, vol. ii*).

The Germanic origin of New England towns. (*Abstract in Harvard University Bulletin, June*, 1881; *Hist. and Pol. Studies*).

Saxon tithingmen in America. (*American Antiquarian Society, Proc., vol. i, part* 3; *Hist. and Pol. Studies*).

Norman constables in America. (*New England Historic, Genealogical Society, Proc., April, July*, 1882; *Hist. and Pol. Studies*).

Village communities in America, comprising seven minor papers. (*Historical Collections of Essex Institute, vol. xix; republished as* Cape Anne and Salem Plantations *in Hist. and Pol. Studies*).

The origin of Stockbridge and of village improvement in Berkshire. (*Berkshire Courier, Great Barrington, Mass., Aug.* 30, 1882; *to be published in full*).

Plymouth Rock restored. (*Magazine of Am. History, Dec.*, 1882).

Pilgrim Fathers as colonists. (*Univ. Circulars*, 7).

Historical Reviews in the *Nation:* Lodge's short history of the English colonies in America (*May* 26, 1881); Yorktown (*Oct.* 13, 1881); Draper's King's Mountain (*Dec.* 1, 1881); Freeman's subject and neighbour-lands of Venice (*Feb.* 9, 1882); Libraries in Baltimore (*Feb.* 9, 1882); The St. Clair papers (*May* 4, 1882); Freeman's William Rufus (*June* 22, 1882).

ADAMS, H. C.

History of taxation in the United States, (*Graduating thesis, J. H. U.*, 1878), published under the title, Zur geschichte der besteuerung in den Vereinigten Staaten von Amerika in der periode von 1789-1816. (*Zeitsch. f. d. gesam. Staatswissen., Tübingen*, 1879).

Cooperation. (*Am. Social Science Assoc.*, 1878).
Historical position of socialism in the development of political economy. (*Penn. Monthly*, 1879).
Payment of public debts. (*International Review, Sept.*, 1881).
Democracy. (*New Englander, Nov.*, 1881).
Modern public debts. (*International Review, March*, 1881).
Irish land question. (*New Englander, Feb.*, 1881).
Outline of lectures upon political economy. (*Baltimore*, 1881).

ALLINSON, F. G.

Attributive positions of the possessive pronoun in Herodotus, Lysias, Isocrates, and Demosthenes. (*Quaker Alumnus, Phila.*, 1878).
On Ionic forms in the second century, A. D., and the obligations of Lucian to Herodotus. (*Graduating thesis, J. H. U.*, 1880).
A proposed redistribution of parts in the Parodos of the Vespae of Aristophanes. (*Philol. Jour.*, 1880).
Note on Πίαρ as an adjective. (*Philol. Jour.*, 1880).
Notice of Arnoldt's Chor in Agamemnon. (*Philol. Jour.*, 1881).

ATKINSON, I. E.

The botanical relations of tricophyton tonsurans. (*N. Y. Medical Journal*, 1878; *Biol. Studies*, 1879).

AYRES, B.

The gramme machine. (*Scientific American, Supp.*, 1876).
The telephone. (*Jour. of Franklin Inst.*, 1878).
New arrangement for telephone. (*Scientific American, Supp.*, 1878).
Two new forms of Bell telephone. (*Jour. of Franklin Inst.*, 1878).

BEMIS, E. W.

Local government of Michigan and the Northwest. (*Am. Social Science Assoc.*, 1882; *Hist. and Pol. Studies*).

BEVIER, L.

On the genuineness of the first Antiphontean oration. (*Graduating thesis, J. H. U.*, 1882; *Univ. Circulars*, 10).

BLOOMFIELD, M.

On the Vedic compounds having an apparent genitive as prior member. (*American Oriental Society, Proc., Oct.*, 1878.)
Noun-formation of Rig-veda. (*Graduating thesis, J. H. U.*, 1879.)
The ablaut of Greek roots which show variation between *E* and *O*. (*Philol. Jour.*, 1880).
Das Grhyasaṅgrahapariçista des Gobhilaputra. (*Zeitsch d. deut. morgenländ. Ges., Vol.* XXXV; *Univ. Circulars*, 15).
On non-diphthongal *E* and *O* in Sanskrit. (*Am. Oriental Society, Proc.*, 1881).
Final *AS* before sonants in Sanskrit. (*Philol. Jour.*, 1882).
Review of G. Meyer's griechische grammatik. (*Philol. Jour.*, 1882).
A search for functional or dialectic differences in the present systems of the Veda. (*Am. Oriental Soc., Proc., Oct.*, 1882).
The relation of εἰδώς : ἰδνία. (*Univ. Circulars*, 12).
The etymology of ἀμβλακεῖν. (*Univ. Circulars*, 18).

BOOKER, W. D. See H. N. MARTIN.

BRANDT, H. C. G.

The Roman alphabet in German. (*Am. Philological Assoc., Proc.*, 1878).
On recent investigations of Grimm's law. (*Philol. Jour.*, 1880).
Lessing's Nathan der Weise. *Ed.* with introduction and notes. (*N. Y., Holt*, 1880).
Verner's law. (*Univ. Circulars*, 3).
Isolated forms in New High German. (*Univ. Circulars*, 13).
Reviews and notices in *Philol. Jour.*, (1880): Hewett's Frisian language and literature; Braune's Gotische grammatik; Zeitschrift für orthographie; (1881): Paul's mittelhochdeutsche grammatik; Weinhold's mittelhochdeutsche grammatik; Carpenter's grundriss der neuislandischen grammatik; Otis' elementary German; Paul's altdeutsche Textbibliothek; Seuffert's Deutsche literaturdenkmale.

BRANTLY, W. T.

Influence of European speculation in the formation of the Constitution of the United States. (*Southern Law Review, Aug., Sept.*, 1880).

BRIGHT, J. W.

A discussion of the verbal forms in King Alfred's West-Saxon Version of Gregory's Cura Pastoralis. (*Graduating thesis, J. H. U.*, 1882).

BROOKS, W. K.

A remarkable life-history. (*Am. Naturalist, Nov.*, 1876).
A provisional hypothesis of pangenesis. (*Am. Naturalist, March*, 1877).
Parthenogenesis in vertebrates and molluscs. (*Am. Naturalist, Oct.*, 1877).
Instinct. (*Popular Science Monthly*, 1877).
Animals and plants. (*Popular Science Monthly*, 1877).
The education of woman from a zoölogical point of view. (*Pop. Sci. Mon.*, 1878).
Preliminary observations upon the development of the marine prosobranchiate gasteropods. (*Biol. Studies*, 1879; 1 *plate*).
The development of lingula and the systematic position of the branchiopoda. (*Biol. Studies*, 1879; 6 *plates*).
The larval stages of squilla empusa. (*Biol. Studies*, 1879; 5 *plates*).
The development of the digestive tract in molluscs. (*Boston Soc. of Nat. Hist., Proc.*, 1879).
Abstract of observations on the development of the American oyster. (*Zoölog. Anzeiger*, 1879).
The artificial fertilization of oyster eggs and the propagation of the American oyster. (*Am. Journal of Science*, 1880).
Observations upon the early stages in the development of the fresh water pulmonates. (*Biol. Studies*, 1880; 4 *plates*).
The development of the American oyster. (*Maryland Fish Commission, Report*, 1880; *Biol. Studies*, 1880, *pp.* 101; 10 *plates*).
The acquisition and loss of a food yolk in molluscan eggs. (*Biol. Studies*, 1880; 1 *plate*).
The development of the cephalopoda and the homology of the cephalopod foot. (*Am. Journal of Science*, 1880).
The rhythmical character of segmentation. (*Am. Journal of Science*, 1880).
Budding in free medusae. (*Am. Naturalist*, 1880).
Embryology and metamorphosis of lucifer. (*Zoölog. Anzeiger*, 1880).
The early stages of the squid. (*Memorial Volume, Boston Society of Natural History*, 1880, *pp.* 20; 4 *plates*).
The young of the crustacean lucifer, a nauplius. (*Am. Naturalist, Nov.*, 1880).
Alternation of periods of rest with periods of activity in the segmenting eggs of vertebrates. (*Biol. Studies*, 1881; 1 *plate*).
Du développement de la lingula et de la position zoölogique des branchipods. (*Archiv. f. Zoölogie expérimentale*, 1881).
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List of the medusae of Beaufort, N. C. (*Biol. Studies*, 1882).
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The development of lucifer. (*Royal Society, London, Phil. Trans.*, 1882, *pp.* 80; 11 *plates*).
Handbook of invertebrate zoölogy. (*Boston, Cassino*, 1882, *pp.* 400).
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The metamorphosis of alpheus. (*Univ. Circulars*, 17).
The metamorphosis of penaeus. (*Univ. Circulars, in press*).
Speculative zoölogy. (*Popular Science Monthly, in press*).
And E. B. WILSON. The first zoea of porcellana. (*Biol. Studies*, 1881; 2 *plates*).

BROUN, P. H. See I. REMSEN.

BROWNE, W. HAND.

Translation of J. von Falke's Greece and Rome: their life and art. (*N. Y., Holt, pp.* 350, 1882).
The Clarendon dictionary of the English language. [Prepared with the assistance of the late Prof. S. S. Haldeman]. (*University Publishing Co.*, 1882).

BURGESS, E. S.

Certain locatives in Andocides. (*Univ. Circulars*, 10).

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On erbium and yttrium. (*Jour. of Chemical Society, London*, 1879).
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BURT, B. C.

Shakespeare and the seventeenth century. (*New Englander, May*, 1881).
Kant and the present. (*Unity, June*, 1881).
Kant and his critics. (*Unitarian Review, June*, 1882).

CARPENTER, W. H.

Tóukvaedhi, an Icelandic poem, from about 1650, A. D. (*Philol. Jour.*, 1881).
Folksongs of the Faroe Islands. (*New Englander, May*, 1882).
Recent work in Old Norse. (*Philol. Jour.*, 1882).
Review of Kölbing's Elis Saga. (*Philol. Jour.*, 1882).
Loss of strong verbs in New Icelandic. (*Univ. Circulars*, 13).
Notes on a German passion play. (*Univ. Circulars*, 17).

CAYLEY, A. (While in Baltimore).

On the 34 concomitants of the ternary cubic. (*Math. Jour.*, 1881).
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On the analytical forms called trees. (*Math. Jour.*, 1882).
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Tables for the binary sextic. (*Math. Jour.*, 1882).
On the geometrical forms called trees. (*Univ. Circulars*, 15).
On the geometrical representation of an equation between two variables. (*Univ. Circulars*, 15).
On associative imaginaries. (*Univ. Circulars*, 15).
A problem of analytical geometry. (*Univ. Circulars*, 16).
On the geometrical interpretation of certain formulae in elliptic functions. (*Univ. Circulars*, 17).
Note on the formulae of trigonometry. (*Univ. Circulars*, 17).

CLARKE, S. F.

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New hydroids of the Pacific coast, south of Vancouver Island. (*Conn. Academy*, 1876).
Hydroids of Alaska. (*Acad. of Nat. Sciences, Phila.*, 1876; *Smithsonian Inst.*, 1876).
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Development of amblystoma punctatum, Baird. (*Graduating Thesis, J. H. U.*, 1879; *Biol. Studies*, 1879).
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Review of Skeat's Etymological Dictionary. (*Philol. Jour.*, 1880).
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Motion of a point upon the surface of an ellipsoid. (*Math. Jour.*, 1878).
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Treatise on the mathematical theory of projections. (*U. S. Coast Survey*, 1879).
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Some elliptic function formulae. (*Math. Jour.*, 1882).
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Final sentences in the New Testament. (*Univ. Circulars*, 10).

DAVIS, E. W.

Note on binodal quartics. (*Univ. Circulars*, 17).

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DONALDSON, F. See W. H. HOWELL and H. SEWALL.

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And M. WARFIELD. Influence of digitaline on the work done by the heart of the Slider terrapin. Two papers. (*Biol. Studies*, 1882; *Med. and Chirurg. Faculty of Md., Trans.*, 1882).

DUGGAN, J. R.

Estimation of urea by sodium hypobromite. (*Chem. Jour.*, 1882).

DURFEE, W. P.

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This Report covers the Academic year ending September 1, 1882. The Appendix contains some statements of a more recent date.

Issued November 11, 1882.

TENTH ANNUAL REPORT

OF THE PRESIDENT OF THE

JOHNS HOPKINS UNIVERSITY

Baltimore, Maryland

1885

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John S. Billings, M. D., LL. D., . . *Lecturer on Municipal Hygiene.*
Léonce Rabillon, Bach. ès Lett., . . *Lecturer on French Literature.*

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Maurice Bloomfield, Ph. D., . . . *Associate Professor of Sanskrit.*
William K. Brooks, Ph. D., . . . *Associate Professor of Morphology.*
Thomas Craig, Ph. D., . . *Associate Professor of Applied Mathematics.*
A. Marshall Elliott, A. M., . *Associate Professor of the Romance Languages.*
Harmon N. Morse, Ph. D., . . . *Associate Professor of Chemistry.*
William E. Story, Ph. D., . . . *Associate Professor of Mathematics.*
Minton Warren, Ph. D., ... *Associate Professor of Latin.*
George H. Williams, Ph. D., . . *Associate Professor of Mineralogy.*
Henry Wood, Ph. D., ... *Associate Professor of German.*

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William T. Councilman, M. D., ... *Associate in Pathology.*
Richard T. Ely, Ph. D., . . . *Associate in Political Economy.*
Fabian Franklin, Ph. D., ... *Associate in Mathematics.*
Edward M. Hartwell, M. D., Ph. D., . *Associate in Physical Training.*
William H. Howell, Ph. D., ... *Associate in Biology.*
J. Franklin Jameson, Ph. D., ... *Associate in History.*
Arthur L. Kimball, Ph. D., ... *Associate in Physics.*
Henry A. Todd, Ph. D., . . . *Associate in Romance Languages.*
Philip R. Uhler, ... *Associate in Natural History.*

James W. Bright, Ph. D., ... *Instructor in English.*
Henry H. Donaldson, Ph. D., ... *Instructor in Psychology.*
Julius Goebel, Ph. D., ... *Instructor in German.*
George Hempl, A. B., ... *Instructor in German.*
J. P. McMurrich, Ph. D., ... *Instructor in Osteology, etc.*
Edward H. Spieker, Ph. D., . . . *Instructor in Latin and Greek.*
Charles A. Perkins, Ph. D., ... *Assistant in Physics.*
Edmund Renouf, Ph. D., ... *Assistant in Chemistry.*
Hugh Newell, ... *Instructor in Drawing.*
Charles L. Woodworth, Jr., ... *Instructor in Elocution.*

TENTH ANNUAL REPORT

OF THE PRESIDENT OF THE

Johns Hopkins University

Baltimore, Maryland

1885

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1885

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Tenth Annual Report.

To the Trustees of the Johns Hopkins University:

I have the honor of submitting the tenth annual report of the progress of the Johns Hopkins University, which covers the ninth year of instruction and closes September 1, 1885. So much detailed information is now given in the Circulars which are published several times during the academic year, that the annual reports will doubtless be more and more regarded as convenient summaries of what has already been made known, and not as the original announcement of official actions.

The year has been one of quiet and satisfactory work without any fundamental changes in our methods or in our buildings. A full account is given, in the appendix, of all courses and classes.

The Group System of Undergraduate Studies.

The Annual Register, published in June last, was thoroughly revised so as to make its state-

ments, which are of necessity complex, more easily intelligible, and especially to bring out more distinctly than hitherto the arrangement of undergraduate studies in parallel "Groups," each of which leads to the Bachelor's degree. Much thought has been given during the year to an application of the "Group" idea to those advanced courses which lead to the degree of Doctor of Philosophy; and a trial scheme has been prepared by the Board of University Studies, suggesting as judicious certain combinations of subjects in which instruction is here provided.

In a good system of collegiate education, there are always two forces at work, freedom and authority, both of which are important for the attainment of the highest results in mental development. Without spontaneous exertions on the part of the scholar in the pursuit of knowledge higher instruction is difficult, mechanical, and comparatively unfruitful; on the other hand the progress of a scholar, who is not guided by a qualified teacher, is in danger of being slow, blundering, and rambling. The problem which always perplexes college faculties, and also individual parents, teachers, and pupils, is the adjustment of these two forces so that the resultant motion shall be in the right direction, with the least possible loss of energy. The problem has grown more and more difficult during the last quarter of a century. Science has

made its great advances; modern languages have asserted their importance; the domain of classical instruction has been widened; history and political science have been recognized as of great educational value. Moreover, the pecuniary resources of American colleges have been enlarged, and the number of teachers, each desirous of enforcing the value of his own pursuits, has been greatly increased. It is not surprising therefore that the old "curriculum," as it is termed, has been esssentially modified in most of the larger colleges of this country, and that "electives" are more and more allowed. These new and perplexing conditions have been recognized in this university since its foundation, and the experience of several years has confirmed the plans originally adopted. In place of a single curriculum, and instead of no curriculum, several parallel curricula have been arranged, which are assumed to be equally honorable, liberal and difficult, and which therefore lead to the same degree of Bachelor of Arts. They all include the study of (*a*) language and literature, (*b*) mathematics and other exact sciences, (*c*) historical and moral science, but the proportions of the different studies vary. Seven schedules are announced upon the Register, one of which must be chosen by every undergraduate who wishes to proceed to the Bachelor's degree. Certain studies are common to all these courses, that

is to say, must be taken up by every undergraduate. Besides giving evidence of a good English education, the student before his matriculation, must pass an examination in Latin and Mathematics, and also in Greek, unless he distinctly gives up the classical course, in which case he may offer German and French as a substitute. Whatever course he afterwards follows must include physical geography, history and the critical study of English; logic, ethics and psychology; the continued study of modern languages; at least a year in some scientific course connected with laboratory work; together with physical and vocal culture, and drawing. In addition to these studies he must devote his attention daily for two years to two comprehensive courses (such as Greek and Latin, or chemistry and physics, or Latin and mathematics, or modern languages, etc.), which will develop the tendency of his intellectual life. The seven groups, for which, in accordance with these principles, arrangements are now made, are these:—

1. Classical,—corresponding closely with what has been hitherto known in this country as the usual college course;

2. Mathematical-Physical,—which meets the wants of those who are expecting to enter upon the modern vocations in which rigid mathematical discipline is indispensable;

3. Chemical–Biological,—which is adapted to those, among others, who expect to enter upon the subsequent study of medicine;

4. Physical–Chemical,—which is most likely to be followed by students preparing for those scientific pursuits which are neither chiefly mathematical nor chiefly biological;

5. Latin–Mathematical,—which affords a good fundamental training, without prolonged attention to the study of Greek;

6. Historical–Political,—which furnishes a basis for the subsequent study of law;

7. Modern Language,—where French, German, English, and in exceptional cases, other modern languages, take the place of Latin and Greek in the traditional classical course.

New Buildings.

Near the close of last year's session, plans were drawn for the construction of a Physical Laboratory on the site at the corner of Monument and Garden streets. The building will go rapidly forward and the contract provides for its completion September 1, 1886. This action of the Trustees will furnish much-needed relief to an important part of the university. The literary departments next require improved and enlarged rooms, for the accommodations now provided for them are inadequate and inconvenient. It should be borne in mind that the

number of students and of classes has rapidly increased, so that rooms which served us well enough at first are quite too restricted for our present necessities. The aggregate attendance has nearly doubled in the last five years. In History there are one hundred and nine scholars, in German one hundred and seven, in Latin sixty-four, and although these companies never meet as one class, yet they require a large amount of space. The library and the various subordinate collections of books for seminary use likewise occupy a great deal of room; so that the time is clearly at hand for the construction of an academical building adapted to literary in distinction from scientific work. We also want much better rooms for public assemblies. I cannot but hope that some friend of this university, some man of wealth who loves the place of his nativity or residence, and who desires to contribute toward the education of youth under most favorable circumstances, will offer to provide such a hall as we so much need. In Cornell University are separate halls which bear the names of McGraw, Sibley, and Sage; at Cambridge, New Haven, and Princeton, liberal gifts for buildings have frequently been made within the last few years; and I believe the day will surely come when a like spirit of liberality will be rendered to this foundation. It cannot come too soon.

Numerical Statements.

The academic staff included during the year fifty-two teachers, five of whom were non-resident lecturers. The number of students enrolled during the year was two hundred and ninety, of whom one hundred and thirty were residents of Maryland, and one hundred and forty-five came here from thirty-two other States of the Union, and fifteen from foreign countries. Among the students were one hundred and seventy-four already graduated, coming from ninety-five colleges and universities; there were sixty-nine matriculates (or candidates for the degree of Bachelor of Arts); and there were forty-seven admitted as special students, to pursue courses of study for which they seemed fitted, without reference to possible graduation. The attendance upon the public lectures (not including those in French) averaged two hundred and twelve.

Nine young men have been admitted to the degree of Bachelor of Arts, and thirteen have been promoted to that of Doctor of Philosophy—making in all twenty-two graduates. Since degrees were first conferred, in 1878, eighty-eight persons have attained the Baccalaureate degree, and sixty-seven have been promoted to the degree of Doctor of Philosophy.

The following table indicates the enrolment of students in each year since the university was opened in the autumn of 1876:—

	Graduates, (incl. Fellows.)	Matriculates.	Non-Matriculates.	Total Enrolled.	Average Attendance at Public Lectures.
1876–77	54	12	23	89	60
1877–78	58	24	22	104	84
1878–79	63	25	35	123	96
1879–80	79	32	48	159	113
1880–81	102	37	37	176	186
1881–82	99	45	31	175	137
1882–83	125	49	30	204	148
1883–84	159	53	37	249	122
1884–85	174	69	47	290	212

The attendance upon some of the principal courses during the last five years has been as follows:

	1880–81.	1881–82.	1882–83.	1883–84.	1884–85.
Mathematics, ...	31	33	35	37	75
Physics, ...	35	42	50	56	80
Chemistry, ...	40	44	49	51	76
Mineralogy, ...					41
Biology, ...	25	32	30	47	44
Greek, ...	31	33	44	41	41
Latin, ...	40	39	41	48	64
Sanskrit, etc., ...	*	6	8	10	25
Shemitic Languages, . .	*	*	*	13	13
German, ...	55	47	50	63	107
French, Italian, etc., . .	33	26	31	31	63
English, ...	29	22	45	50	68
History and Political Science, ...	40	40	64	88	109
Psychology, Ethics, etc., .	14	22	47	28	44

*Not recorded.

During nine years, eight hundred individuals have been enrolled as students, of whom three

hundred and eighty-six have come from Maryland, (including three hundred and eight from Baltimore), and four hundred and fourteen from forty-seven other States and countries. Of this number four hundred and seventy-four persons pursued courses as graduate students, and three hundred and twenty-six as collegiate students.

Sir William Thomson's Lectures.

Reference was made a year ago to the lectures which were given here in October, 1884, by Sir William Thomson, D. C. L., F. R. S., etc., Professor in the University of Glasgow. This was one of the most remarkable courses ever given in this university, whether the eminence of the lecturer be considered and the freshness and scope of his thoughts, or the intellectual character of the auditors who followed him. Most of his hearers were professors and teachers of physics, and many of them came from a long distance at a very considerable sacrifice. The subject was announced under the general term "Molecular Dynamics," and the treatment was confined to the Wave Theory of Light, largely dealing with the difficulties of the theory. A nearly *verbatim* report of what was said was published by the university, with the author's consent, soon after the lectures closed. These notes which were taken by Mr. A. S. Hathaway, lately a Fellow in Mathematics here, and now an instructor

in Cornell University, were printed by the papyrograph process. An edition of three hundred copies was sold at once. From a recent letter of Sir William Thomson, it appears that he is now expecting to recast these lectures and to issue them in a printed volume at an early day. An interesting account of the topics considered and of the methods employed in their discussion was published in *Nature* (London, Nos. 803, 805, 809, March, April, 1885) by Professor George Forbes, F. R. S., of London, who had been in Baltimore during the continuance of the course. This review has been reprinted in our current Circulars (Volume IV, page 113). As an indication of the impression made by the distinguished lecturer, Professor Forbes remarks: "The lectures treated of three branches of the subject: (1) the propagation of a disturbance through an elastic medium; (2) the character of molecular vibration; and (3) the influence of molecules on the propagation of waves. Each lecture generally dealt with two of these branches, and between the two parts of the lecture Sir William went among his audience and had some conversation with them. It was ever his object to discard the professorial attitude and give his lectures the aspect of conferences. Discussion did not end in the lecture-room, and the three weeks at Baltimore were like one long conference guided by the master-mind. It is not surprising

that at the end of that time there was a genuine feeling of sadness at parting on the part of teacher and taught alike."

The visit of Sir William Thomson recalled to many minds the previous and much longer residence among us of Professor Cayley of the University of Cambridge. After returning to England, he revised the lectures he had delivered here, making some important additions to them, and began to print the whole as a memoir in the American Journal of Mathematics. Seven chapters of this treatise on "the Abelian and Theta Functions" have already been published, and the editors anticipate the pleasure of seeing the memoir completed in subsequent numbers of the Journal.

LECTURES ON SHAKESPEARE AND OTHER PUBLIC LECTURES.

Special study was directed during the year to the writings of Shakespeare. Professor Corson, whose instructions during two preceding winters had exerted a marked influence in this community, gave twenty lectures upon Shakespeare, in January, February, and March. After two introductory discourses, he discussed ten of the principal plays, namely, Romeo and Juliet, King John, Much Ado about Nothing, Hamlet, Macbeth, Coriolanus, Julius Cæsar, Antony and Cleopatra, Winter's Tale, and Cymbeline. It was the speaker's purpose, as he stated it, to represent the poet's early, middle, and

late work, and, along with a presentation of the organic structure of the plays selected, to indicate Shakespeare's progress in the creation of character, to contrast his portrayal of characters with that of Ben Jonson and other contemporary dramatists, and especially to set forth his interpretation of life which is concretely resident in the plays,—in a word, to present the plays on the human side rather than on the scholastic.

In connection with this course, a Shakespeare Circle was formed among the students, and to those who were thus enrolled two dramatic recitals were given by David C. Bell, Esq., formerly of Canada and now of Washington. Two lectures were also given by Justin Winsor, Esq., of Harvard College, one on Shakespeare Bibliography and one on Shakespeare Portraiture, both illustrated by works which had been borrowed from the libraries in Baltimore and elsewhere, through the friendly mediation of Mr. J. W. M. Lee. It was intended to enlarge this list of lecturers on Shakespeare, but the inability of one Shakespeare scholar of great renown to accept the invitation which was extended to him, and the illness and death of another distinguished commentator interrupted the plan. At one of the Peabody concerts, under the direction of Mr. A. Hamerik, some pieces of music suggested by the return of Shakespeare's birthday were performed, but it was not found possible, with the

resources at our command, to secure a Shakespeare concert. Recitals of four plays were given at the Peabody Institute by Mr. Locke Richardson.

During the month of January, Mr. Edmund Gosse, of London, Clark Lecturer on English Literature in the University of Cambridge, gave a course of six lectures on the Rise of Classical Poetry in England from Shakespeare to Pope. These lectures have since been printed in a volume. Mr. Gosse by special request gave two other lectures of a less formal character on the poet Gray, of whose life and writings he had made a special study preparatory to the publication of a new edition of the poet's writings.

So large a number of persons desired to hear Professor Corson and Mr. Gosse that the authorities of the Peabody Institute kindly opened one of their large halls to the university and these lectures were therefore announced as under the auspices of both foundations.

Professor J. Rendel Harris gave a course of lectures on the Perpetuation of Ancient Manuscripts, addressed especially to the students of ancient languages, and subsidiary to philological, biblical, archæological, and historical research. As far as possible, they were illustrated by facsimiles and representations of the ancient documents to which reference was made. This course and the following were given in Hopkins Hall.

The modern science of Phonetics was presented in four lectures by Mr. A. Melville Bell, of Washington, the author of a work on "Visible Speech," which were followed by two lectures, from the same gentleman, on English Pronunciation.

A course of lectures on Spanish and Portuguese Literature was given by the principal teachers in the department of the Romance Languages. Mr. A. M. Elliott, the Associate Professor, took for his theme the life and writings of Camoens, and Mr. H. A. Todd, the Associate, discussed Contemporary Spanish Literature.

Mr. Rabillon gave forty lectures (in French) on select topics pertaining to French literature.

To the graduate students, a course of educational lectures was given on successive Saturdays, during the months of November, December and January. The speakers and their subjects were as follows:

D. C. Gilman, Academic degrees;
G. S. Hall, Student life;
S. Newcomb, Mathematics and education;
M. Bloomfield, Method of comparative philology as pursued to-day;
W. K. Brooks, The zoölogical significance of education;
T. Craig, Mathematical teaching in France;
A. M. Elliott, Methods in the study of modern languages;
R. T. Ely, Educational value of political economy;
J. R. Harris, On the study of ancient MSS.;
E. M. Hartwell, Physical training in American colleges;
W. E. Story, Methods of teaching arithmetic;
M. Warren, Application of the historical method to the study of Latin.

THE LIBRARY.

The Library has made a constant growth during the year. Large purchases have been made of books pertaining to Psychology and Pedagogics, History and Political Science, and the Shemitic Languages. A set of the *Annales de Chimie et de Physique* (1790–1875) has also been bought.

From the Librarian's report it appears that the accessions of the year have been 4,600 volumes, making the whole number of bound volumes now belonging to the collection, 26,315. Of these accessions, those relating to certain special studies have been placed in the rooms where those studies are pursued, as in previous years. While there are objections to this segregation, the want of room in the main library compels it.

The present distribution is substantially as follows:

1. On the main floor of the central library, dictionaries, cyclopædias, and standard books in literature, history and philosophy;

2. In alcoves adjacent to the central room sets of literary periodicals and scientific transactions; works on philosophy and pedagogics; Romance, Teutonic, and English philology and literature; bibliography;

3. On the floor above the central library, works on ancient and modern history, public law and

political economy, including the Bluntschli collection;

4. In the classical rooms, the principal Greek and Latin writings;

5. In the oriental class rooms, books pertaining to Shemitic languages, and to Sanskrit;

6. In the chemical laboratory, the long sets of chemical journals, and works on chemistry;

7. In the biological laboratory, books of biology, physiology, medicine, and hygiene.

To a considerable extent, current periodicals are placed near the books to which they belong; but in the central room a very large number of those which are of general interest are retained.

The number of serials, scientific and literary, received by the university exceeds seven hundred. Including those which are taken by other public institutions of Baltimore, nine hundred periodicals, exclusive of newspapers, are accessible. In the Johns Hopkins University Circular No. 42 a list of those which are received by the university has been printed.

THE MINERALOGICAL CABINET.

The mineralogical cabinet has received no very important additions since the purchase of the Allen and Root collections last year. Several donations and the weekly excursions of the Naturalist's Field Club have considerably increased the

number of specimens from the vicinity of Baltimore, to which one case in the cabinet is especially devoted.

The petrographical cabinet has been enlarged by the purchase of a suite of typical European rocks, numbering over four hundred specimens and also by the acquisition of one of the collections made by Prof. C. H. Hitchcock to illustrate the rocks of New Hampshire, which have been so carefully studied and described by the late Dr. G. W. Hawes.

Several pieces of apparatus, including a new petrographical microscope and a diamond saw for cutting rock-sections, have been added to the mineralogical laboratory.

Publications.

The journals which are published under the auspices of the Trustees, have appeared regularly during the last year, and as far as I am capable of judging are more and more worthy of the financial support they have received from the university chest. The American Journal of Philology and the American Journal of Mathematics, which appear quarterly, and the American Chemical Journal appearing six times during the year, have reached respectively the sixth, the eighth, and the seventh volume. It is interesting to observe that a single number of the mathematical

journal contained seven contributions from writers resident in six different countries. The third volume of the Studies from the Biological Laboratory is in progress. It is devoted exclusively to the original work in biology of those who are or have been connected with this foundation. The Studies in Historical and Political Science do not appear as a journal, but as a series of monographs upon American institutions, contributed partly by members of our own body and partly by other writers. The third volume is nearly complete.

Of the Johns Hopkins University Circulars nine numbers, including 134 pages, were printed during the year. In addition to their use as the ready means of publishing official announcements, the Circulars are the repository of short abstracts of scientific inquiries which are here in progress.

Besides the periodicals above mentioned, the enterprise of one of the Fellows of this institution, A. L. Frothingham, Jr., Ph. D., has led to the commencement of a Journal of Archæology, to be published in Baltimore under his control as a managing editor, with the counsel and aid of prominent members of the American Institute of Archæology, of which it is to be an official organ. This journal is not printed under the auspices of this University and does not receive its financial support, but it is here regarded as

a very important agency in the promotion of American scholarship and as deserving the hearty encouragement of those who are interested in the progress of archæological science.

In this connection reference may be made to a series of exhibitions which were held during the winter under the auspices of the University Archæological Society in one of our halls. A large number of old and rare engravings and original drawings were loaned by Mr. A. L. Frothingham, the plates exhibited being frequently changed. Some interesting Italian antiquities of the Etruscan and Roman periods were also exhibited by him and by Mrs. L. Williams. These exhibitions were attended by our own students and also by many persons not connected with the university. Brief explanatory remarks were often addressed to the assembled company by the secretary of the society.

In the course of the winter, Rev. Dr. C. R. Hale, of Baltimore, while on a visit to Constantinople, secured photographs of three pages of the celebrated book which contains the manuscript "Teaching of the Twelve Apostles." So much interest had been shown in this ancient document, after it was transcribed and printed by Bishop Bryennios, — that the university decided to issue with explanatory notes a small edition of these photographs. They were edited by Prof. J. R. Harris,

and one hundred and twenty-five copies (to which the edition was limited) were quickly distributed. Reference has been made on a previous page to the published report of Sir W. Thomson's lectures.

GRADUATES OF THE YEAR.

Nine undergraduates have come forward to the baccalaureate degree during the year, namely: —

BACHELORS OF ARTS, 1884–85.

John Pendleton Campbell, West Virginia.
John Glenn, Jr., Baltimore.
Junius Moore Horner, North Carolina.
James Albert Loane, Baltimore.
Harry Wilbur Price, District of Columbia.
Benjamin Titus Roberts, Jr., New York.
Moses Roth Ryttenberg, Baltimore.
Hugo Steiner, Baltimore.
Henry Hazlehurst Wiegand, Baltimore.

Thirteen candidates, who had presented the requisite theses and had also passed the examinations successfully, were made doctors of philosophy, namely:

DOCTORS OF PHILOSOPHY, 1884–85.

Edward Webster Bemis, of Springfield, Mass., A. B., Amherst College, 1880. *Subjects:* History and Political Economy. *Thesis:* Local Government in Michigan and the Northwest.

Gustav Bissing, of Baltimore, A. B., Johns Hopkins University, 1882. *Subjects:* Mathematics and Physics. *Thesis:* Some Notes on Gauss' Coordinates and Steiner's Quartic Surface.

Henry Herbert Donaldson, of New York City, A. B., Yale College, 1879. *Subjects:* Animal Physiology and Histology; Vegetable Physiology. *Thesis:* On the Temperature Sense.

Louis Duncan, of Baltimore, U. S. Naval Academy, 1880. *Subjects:* Physics and Mathematics. *Thesis:* On the Determination of the Ohm by the Lorenz Method.

Homer Winthrop Hillyer, of Waupun, Wis., S. B., University of Wisconsin, 1882. *Subjects:* Chemistry and Physics. *Thesis:* Methods of Determining the Relative Stability of the Fatty Bromides.

Frederic Schiller Lee, of Canton, New York, A. B., St. Lawrence University, 1878, and A. M., 1881. *Subjects:* Animal Physiology and Histology, and Animal Morphology. *Thesis:* On Arterial Tonicity.

Gustav Adolph Liebig, Jr., of Baltimore, A. B., Johns Hopkins University, 1882. *Subjects:* Physics, Mathematics, and Chemistry. *Thesis:* On the Variation of the Specific Heat of Water.

James Playfair McMurrich, of Guelph, Canada, A. B., University of Toronto, 1879, and A. M., 1882. *Subjects:* Animal Morphology, Animal Physiology and Histology, and Vegetable Morphology. *Thesis:* The Osteology and Myology of *Amiurus catus.* (L.) Gill.

Albert Gallatin Palmer, of Baltimore, A. B., Johns Hopkins University, 1882. *Subjects:* Chemistry and Physics. *Thesis:* On the Conduct of p-Diazo-o-Toluene-sulphonic Acid toward Alcohol.

Harry Fielding Reid, of Baltimore, A. B., Johns Hopkins University, 1880. *Subjects:* Physics and Mathematics. *Thesis:* On the Distribution of Energy in the Spectrum of Platinum at Different Temperatures.

Henry Alford Short, of New York City, A. B., Columbia College, 1880. *Subjects:* Greek and Latin. *Thesis:* On the Development and Use of ὡς Final.

Morrison Isaac Swift, of Ashtabula, Ohio, A. B., Williams College, 1879. *Subjects:* Ethics and History of Philosophy, with Psychology and Political Economy. *Thesis:* On the Ethics of Idealism, as represented by Aristotle and Hegel.

Henry Alfred Todd, of Baltimore, A. B., Princeton College, 1876. *Subjects:* Romance Languages and Sanskrit. *Thesis:* An *editio princeps* of an Old French poem, entitled "Dit de la Panthère."

Personal Changes.

Professor J. Rendel Harris, who had requested that the tenure of his office might be limited by an annual appointment, declined re-election at the close of the academic session and returned to his former home in Cambridge, England. He had done much to awaken an interest in the studies to which he was devoted, but in matters which pertain to another department of the University he was not in accord with the policy here pursued and consequently gave up his chair. Corres-

pondence is in progress with a distinguished scholar now in Europe, looking forward to his coming here after the completion of certain work in which he is engaged abroad.

Dr. Henry Wood, Associate in the German Language and Dr. George H. Williams, Associate in Mineralogy have been designated Associate Professors, and Dr. H. A. Todd has been appointed Associate in the Romance Languages.

CHESAPEAKE ZOÖLOGICAL LABORATORY.

The Chesapeake Zoölogical Laboratory maintained its eighth session at Beaufort, N. C. A report of its work is given in the Appendix and abstracts of the scientific work are printed in University Circular, No. 43.

Special attention is called to the Appendix in which, — besides the usual register of names, — statements in respect to courses of lectures and classes will be found, and also a list of papers read before the various societies of the university.

D. C. GILMAN,
President of the Johns Hopkins University.

BALTIMORE, *November* 2, 1885.

APPENDIX.

A.

Professors, Associates, Etc., 1876-85.

The names in each group are arranged in the order of appointment. The column of dates indicates the period during which the particular station referred to has been held. In consequence of promotions some names appear in several groups.

PRESIDENT.

DANIEL C. GILMAN,		1875–

PROFESSORS.

BASIL L. GILDERSLEEVE,	*Greek*,	1876–
J. J. SYLVESTER,	*Mathematics*,	1876–1884.
IRA REMSEN,	*Chemistry*,	1876–
HENRY A. ROWLAND,	*Physics*,	1876–
H. NEWELL MARTIN,	*Biology*,	1876–
CHARLES D. MORRIS,	*Classics, (Collegiate)*,	1876–
PAUL HAUPT,	*Shemitic Languages*,	1883–
G. STANLEY HALL,	*Psychology*,	1884–
WILLIAM H. WELCH,	*Pathology*,	1884–
SIMON NEWCOMB,	*Mathematics and Astronomy*,	1884–

ASSOCIATE PROFESSORS.

HERBERT B. ADAMS,	*History*,	1883–
MAURICE BLOOMFIELD,	*Sanskrit*,	1883–
WILLIAM K. BROOKS,	*Morphology*,	1883–
THOMAS CRAIG,	*Applied Mathematics*,	1883–
CHARLES S. HASTINGS,	*Physics*,	1883–1884.
HARMON N. MORSE,	*Chemistry*,	1883–
WILLIAM E. STORY,	*Mathematics*,	1883–
MINTON WARREN,	*Latin*,	1883–
A. MARSHALL ELLIOTT,	*Romance Languages*,	1884–
J. RENDEL HARRIS,	*New Testament Greek*,	1884–1885.
GEORGE H. WILLIAMS,	*Mineralogy*,	1885–
HENRY WOOD,	*German*,	1885–

ASSOCIATES.

JOHN M. CROSS,	*Greek*,	1876–1881.
PHILIP R. UHLER,	*Natural History*,	1876–
AUSTIN SCOTT,	*History*,	1876–1882.
A. MARSHALL ELLIOTT,	*Romance Philology*,	1876–1884.
THOMAS C. MURRAY,	*Shemitic*,	1876–1879.
HERMAN C. G. BRANDT,	*German*,	1876–1882.
WILLIAM K. BROOKS,	*Biology*,	1876–1883.
HARMON N. MORSE,	*Chemistry*,	1876–1883.
ROBERT RIDGWAY,	*Natural History*,	1876–1877.
WILLIAM E. STORY,	*Mathematics*,	1876–1883.
ARTHUR W. TYLER,	*Librarian*,	1876–1878.
CHARLES S. HASTINGS,	*Physics*,	1876–1883.
CHARLES R. LANMAN,	*Sanskrit*,	1877–1880.
HERBERT B. ADAMS,	*History*,	1878–1883.
ALBERT S. COOK,	*English*,	1879–1881.
MINTON WARREN,	*Latin*,	1879–1883.
WILLIAM HAND BROWNE,	*Librarian and English*,	1879–
HENRY SEWALL,	*Biology*,	1880–1882.
THOMAS CRAIG,	*Mathematics*,	1880–1883.
MAURICE BLOOMFIELD,	*Sanskrit*,	1881–1883.
WILLIAM T. SEDGWICK,	*Biology*,	1881–1883.
HENRY WOOD,	*English*,	1881–1884.
FABIAN FRANKLIN,	*Mathematics*,	1882–
RICHARD T. ELY,	*Political Economy*,	1882–
J. FRANKLIN JAMESON,	*History*,	1883–
GEORGE H. WILLIAMS,	*Mineralogy*,	1883–1885.
EDWARD M. HARTWELL,	*Physical Training*,	1884–
HENRY WOOD,	*German*,	1884–1885.
ARTHUR L. KIMBALL,	*Physics*,	1884–
WILLIAM T. COUNCILMAN,	*Pathology*,	1884–
WILLIAM H. HOWELL,	*Biology*,	1885–
HENRY A. TODD,	*Romance Languages*,	1885–

LECTURERS.

Most of the persons named as lecturers have given courses of from six to twenty lectures. A few of them have given much longer courses, extending through half the year or through the entire year. In three cases, only single lectures have been given.

SIMON NEWCOMB,	*Astronomy*,	1876.
LÉONCE RABILLON,	*French*,	1876–
JOHN S. BILLINGS,	*Medical History, etc.*,	1877.
FRANCIS J. CHILD,	*Chaucer, Ballads, etc.*,	1877–1878.
THOMAS M. COOLEY,	*Law*,	1877–1879.

JULIUS E. HILGARD,	*Geodetic Surveys*,	1877.
JAMES RUSSELL LOWELL,	*Romance Literature*,	1877.
JOHN W. MALLET,	*Technological Chemistry*,	1877–1878.
FRANCIS A. WALKER,	*Political Economy*,	1877–1878.
WILLIAM D. WHITNEY,	*Comparative Philology*,	1877.
WILLIAM F. ALLEN,	*History*,	1878.
WILLIAM JAMES,	*Psychology*,	1878.
GEORGE S. MORRIS,	*Philosophy*,	1878–1885.
J. LEWIS DIMAN,	*History*,	1879.
H. VON HOLST,	*History*,	1879.
WILLIAM G. FARLOW,	*Botany*,	1879.
J. WILLARD GIBBS,	*Theoretical Mechanics*,	1879.
SIDNEY LANIER,	*English Literature*,	1879–1881.
CHARLES S. PEIRCE,	*Logic*,	1879–1884.
JOHN TROWBRIDGE,	*Physics*,	1880.
A. GRAHAM BELL,	*Phonology*,	1881.
S. P. LANGLEY,	*Physics*,	1881.
JOHN MCCRADY,	*Biology*,	1881.
JAMES BRYCE,	*Political Science*,	1881.
EDWARD A. FREEMAN,	*History*,	1881.
JOHN J. KNOX,	*Banking*,	1881.
ARTHUR CAYLEY,	*Mathematics*,	1882.
WILLIAM W. GOODWIN,	*Plato*,	1882.
G. STANLEY HALL,	*Psychology*,	1882–1884.
RICHARD M. VENABLE,	*Constitutional Law*,	1882.
JAMES A. HARRISON,	*Anglo-Saxon*,	1882.
J. RENDEL HARRIS,	*New Testament Greek*,	1882–1884.
GEORGE W. CABLE,	*English Literature*,	1883.
WILLIAM W. STORY,	*Michel Angelo*,	1883.
HIRAM CORSON,	*English Literature*,	1883–1885.
F. SEYMOUR HADEN,	*Etchers and Etching*,	1883.
JOHN S. BILLINGS,	*Municipal Hygiene*,	1883–
JAMES BRYCE,	*Roman Law*,	1883.
H. VON HOLST,	*Political Science*,	1883.
WILLIAM TRELEASE,	*Botany*,	1884.
J. THACHER CLARKE,	*Explorations in Assos*,	1884.
JOSIAH ROYCE,	*Philosophy*,	1884.
WILLIAM J. STILLMAN,	*Archæology*,	1884.
CHARLES WALDSTEIN,	*Archæology*,	1884.
SIR WILLIAM THOMSON,	*Molecular Dynamics*,	1884.
A. MELVILLE BELL,	*Phonetics, etc.*,	1885.
EDMUND GOSSE,	*English Literature*,	1885.
EUGENE SCHUYLER,	*U. S. Diplomacy*,	1885.
JUSTIN WINSOR,	*Shakespeare*,	1885.
FREDERICK WEDMORE,	*Modern Art*,	1885.

INSTRUCTORS AND ASSISTANTS.

HENRY SEWALL,	*Biology*,	1876–1878.
SAMUEL F. CLARKE,	*Biology*,	1879–1881.
FABIAN FRANKLIN,	*Mathematics*,	1879–1882.
LYMAN B. HALL,	*Chemistry*,	1879–1880.
CHRISTIAN SIHLER,	*Biology*,	1879–1880.
HENRY C. ADAMS,	*Political Economy*,	1879–1881.
THOMAS CRAIG,	*Mathematics*,	1879–1880.
CHAS. L. WOODWORTH, JR.,	*Elocution*,	1879–
WILLIAM T. SEDGWICK,	*Biology*,	1880–1881.
EDWIN H. HALL,	*Physics*,	1880–1881.
GEORGE H. STOCKBRIDGE,	*Latin and German*,	1880–1881.
PHILIPPE B. MARCOU,	*French*,	1880–1883.
HUGH NEWELL,	*Drawing*,	1880–
R. DORSEY COALE,	*Chemistry*,	1881–1883.
RICHARD T. ELY,	*Political Economy*,	1881–1882.
LAWRENCE B. FLETCHER,	*Physics*,	1881.
GEORGE F. NICOLASSEN,	*Greek and Latin*,	1881–1882.
BENJAMIN E. SMITH,	*Philosophy*,	1881–1882.
EDMUND B. WILSON,	*Biology*,	1881–1882.
JAMES W. BRIGHT,	*German*,	1882–1883.
J. FRANKLIN JAMESON,	*History*,	1882–1883.
EDWARD H. SPIEKER,	*Greek and Latin*,	1882–
HARRY F. REID,	*Physics*,	1882–1884.
CHARLES F. RADDATZ,	*German*,	1882–1885.
EDWARD M. HARTWELL,	*Physical Training*,	1883–1884.
HERBERT W. CONN,	*Osteology*,	1883–1884.
G. THEODORE DIPPOLD,	*German*,	1883–1884.
HENRY H. DONALDSON,	*Animal Physiology*,	1883–1884.
HENRY A. TODD,	*Romance Languages*,	1883–1885.
OTTO LUGGER,	*Curator of Biol. Museum*,	1883–1885.
CHARLES A. PERKINS,	*Physics*,	1884–
WILLIAM H. HOWELL,	*Biology*,	1884–1885.
EDWARD H. KEISER,	*Chemistry*,	1884–1885.
J. PLAYFAIR MCMURRICH,	*Osteology, etc.*,	1884–
ALFRED EMERSON,	*Archæology*,	1884–1885.
EDWARD S. BURGESS,	*Botany*,	1885.
GEORGE HEMPL,	*German*,	1884–
JAMES W. BRIGHT,	*English*,	1885–
HENRY H. DONALDSON,	*Psychology*,	1885–
JULIUS GOEBEL,	*German*,	1885–
EDMUND RENOUF,	*Chemistry*,	1885–

B.

Roll of Fellows.

The following list gives the names of all persons who have been selected by the authorities and appointed to fellowships. Though, in a few cases, by reason of promotion or other causes, the persons designated have not entered upon the fellowships, their names are given to exhibit fully the working of this system of appointment.

The present position or residence of the former holders of fellowships is, in most cases, given after the name.

HENRY C. ADAMS, PH. D., . . . *Political Science*, . 1876–1879.
Associate Professor of Political Economy, Cornell University; Lecturer on Political Economy, University of Michigan.

HERBERT B. ADAMS, PH. D., . . *History*, . . . 1876–1878.
Associate Professor of History, Johns Hopkins University.

WILLIAM K. BROOKS, PH. D., . . *Biology*, . . . 1876.
Associate Professor of Morphology, and Director of the Chesapeake Zoölogical Laboratory, Johns Hopkins University. (*Appointed Associate before entering on the Fellowship*).

THOMAS CRAIG, PH. D., . . . *Mathematics*, . . 1876–1879.
Associate Professor of Applied Mathematics, Johns Hopkins University.

JOSHUA W. GORE, C. E., . . . *Mathematics*, . . 1876–1878.
Professor of Natural Philosophy and Engineering, University of North Carolina.

GEORGE B. HALSTED, PH. D., . . *Mathematics*, . . 1876–1878.
Professor of Mathematics, University of Texas.

EDWARD HART, PH. D., . . . *Chemistry*, . . . 1876–1878.
Assistant Professor of Chemistry, Lafayette College.

DANIEL W. HERING, C. E., . . *Engineering*, . . 1876–1878.
Professor of Mathematics, University of the City of New York.

MALVERN W. ILES, PH. D., . . *Chemistry*, . . . 1876–1878.
Chemist, Leadville, Colorado.

WILLIAM W. JACQUES, PH. D., . . *Physics*, . . . 1876–1879.
Instructor in Telegraph Engineering, Massachusetts Institute of Technology.

CHARLES R. LANMAN, PH. D., . . *Sanskrit*, . . . 1876–1877.
Professor of Sanskrit, Harvard University.

D. MCGREGOR MEANS, A. B., . . *Political Science*, . 1876–1877.
Late Professor of Political and Mental Science, Middlebury College; Attorney at Law, New York City.

HARMON N. MORSE, PH. D., . . *Chemistry*, . . . 1876.
Associate Professor of Chemistry, Johns Hopkins University. (*Appointed Associate before entering upon the Fellowship*).

WALTER H. PAGE, ... *Greek*, . . . 1876–1878.
Journalist, Raleigh, N. C.

P. PORTER POINIER, M. E., . . *Physics*, . . . 1876.
(*Died without entering upon the Fellowship, June*, 1876, *aged* 23 *years*).

E. DARWIN PRESTON, C. E., . . *Engineering*, . . 1876–1878.
U. S. Coast and Geodetic Survey; National Observatory, Cordoba, Argentine Republic.

HENRY J. RICE, SC. D., . . . *Biology*, . . . 1876–1878.
Professor of Natural Science, Brooklyn (N. Y.) High School

JOSIAH ROYCE, PH. D., . . . *Philosophy*, . . 1876–1878.
Assistant Professor of Philosophy, Harvard University.

ERNEST G. SIHLER, PH. D., . . *Greek*, . . . 1876–1879.
Classical Instructor, New York City.

FREDERICK B. VAN VORST, A. B., . *Ethics and Metaphysics*, 1876–1877.
Attorney at Law, New York City.

JOHN H. WHEELER, PH. D., . . *Philology*, . . . 1876–1877.
Professor of Greek, University of Virginia.

SAMUEL F. CLARKE, PH. D., . . *Biology*, . . . 1876–1879.
Professor of Natural History, Williams College.

LYMAN B. HALL, PH. D., . . . *Chemistry*, . . . 1877–1879.
Professor of Chemistry and Physics, Haverford College, Pa.

A. DUNCAN SAVAGE, B. LITT., . . *Greek*, . . . 1876–1879.
New York City.

FABIAN FRANKLIN, PH. D., . . *Mathematics*, . . 1877–1879.
Associate in Mathematics, Johns Hopkins University.

CHRISTIAN SIHLER, M. D., PH. D., . *Biology*, . . . 1877–1879.
Physician, Cleveland, Ohio.

FRANCIS G. ALLINSON, PH. D., . . *Greek and Sanskrit*, . 1877–1880.
Assistant Professor of Greek and Latin, Haverford College, 1880–82; Classical Instructor, Baltimore.

MAURICE BLOOMFIELD, PH. D., . . *Sanskrit and Greek*, . 1878–1879.
Associate Professor of Sanskrit, Johns Hopkins University.

CONSTANTINE FAHLBERG, PH. D., . *Chemistry*, . . . 1878–1880.
Chemist, Gray's Ferry Chemical Works, Philadelphia.

EDWIN H. HALL, PH. D., . . . *Physics*, . . . 1878–1880.
Instructor in Physics, Harvard University.

EDWARD COLES HARDING, A. M., . *Greek*, . . . 1878–1879.
Professor of Greek, University of Louisiana, 1879–80.

ISAAC OTT, M. D., ... *Biology*, . . . 1878–1879.
Physician, Easton, Pa.

HENRY SEWALL, PH. D., . . . *Biology*, . . . 1878–1879.
Professor of Physiology, University of Michigan.

WASHINGTON I. STRINGHAM, PH. D., *Mathematics*, . . 1878–1880.
Professor of Mathematics, University of California.

ABRAM V. E. YOUNG, PH. B., . . *Chemistry*, . . . 1878–1880.
Professor of Chemistry, Northwestern University.

CHARLES R. HEMPHILL, A. M., D. D., *Greek*, . . . 1878–1879.
Late Associate Professor of Biblical Literature, Theological Seminary, Columbia, S. C.; Clergyman, Louisville, Ky.

ALLAN MARQUAND, PH. D., . . *Logic and Ethics*, . 1877–1880.
Professor of the History of Art, Princeton College.

CHARLES A. VAN VELZER, S. B., . *Mathematics*, . . 1878–1881.
Assistant Professor of Mathematics, University of Wisconsin.

BROWN AYRES, S. B., ... *Physics*, . . . 1879–1880.
Professor of Physics, Tulane University, New Orleans.

LOUIS BEVIER, PH. D., . . . *Greek*, . . . 1879–1881.
Instructor in French in Rutgers College.

EDWARD M. HARTWELL, M. D., PH. D., *Biology*, . . . 1879–1881.
Associate in Physical Training, Johns Hopkins University.

JOHN R. MCD. IRBY, PH. D., . . *Mineralogy*, . . 1879–1880.
(*Died March* 25, 1880, *aged* 25 *years*).

MITSURU KUHARA, PH. D., . . *Chemistry*, . . . 1879–1881.
Lecturer on Organic Chemistry, University of Tokio, Japan.

OSCAR H. MITCHELL, PH. D., . . *Mathematics*, . . 1879–1882.
Professor of Mathematics, Marietta College, Ohio.

EDWARD L. NICHOLS, PH. D., . . *Physics*, . . . 1879–1880.
Professor of Physics and Chemistry, University of Kansas.

WALDO S. PRATT, A. M., . . . *Aesthetics, etc.*, . . 1879–1880.
Instructor in Ecclesiastical Music, Theological Seminary, Hartford, Conn.

WILLIAM T. SEDGWICK, PH. D., . *Biology*. . . . 1879–1880.
Assistant Professor of Biology, Massachusetts Institute of Technology.

HERMAN VOORHEES, C. E., . . *Chemistry*, . . . 1879.
(*Died without entering on the Fellowship, October* 14, 1879, *aged* 27 *years*).

CHARLES O. WHITMAN, PH. D., . . *Biology*, . . . 1879.
Professor of Zoölogy, University of Tokio, Japan, 1879–81; Marine Station, Naples, 1881–82; Assistant, Museum of Comparative Zoölogy, Cambridge, Mass. (*Resigned before entering on the Fellowship*).

EDMUND B. WILSON, PH. D., . . *Biology*, . . . 1879–1881.
Associate Professor of Biology, Bryn Mawr College, Pa.

GEORGE F. NICOLASSEN, PH. D., . *Greek*, . . . 1879–1881.
Professor of Greek and Latin, Southwestern Presbyterian University, Tenn.

WILLIAM BURNEY, PH. D., . . *Chemistry*, . . . 1879–1880.
Professor of Chemistry, South Carolina Agricultural College, Columbia.

ROBERT W. PRENTISS, S. B., . . *Mathematics*, . . 1879–1881.
Office of U. S. Nautical Almanac, Washington, D. C.

JAMES W. BRIGHT, PH. D., . . *Teutonic Languages*, . 1880–1882.
Instructor in English, Johns Hopkins University.

BENJAMIN C. BURT, A. M., . . *Philosophy*, . . 1880–1881.
Assistant Professor of English and Rhetoric, University of Michigan.

SPENCER H. FREEMAN, A. M., . . *Physics*, . . . 1880–1882.
Professor of Physics and Astronomy, Adelbert College, Western Reserve University, Ohio.

KAKICHI MITSUKURI, PH. D., . . *Biology*, . . . 1880–1881.
Professor of Zoölogy, University of Tokio, Japan.

BERNARD F. O'CONNOR, PH. D., . *Romance Languages*, . 1880–1882.
Instructor in French, Columbia College.

CHASE PALMER, PH. D., . . . *Chemistry*, . . . 1880–1882.
Professor of Chemistry, Massachusetts State Normal School, Salem.

HERBERT M. PERRY, A. B., . . *Mathematics*, . . 1880–1882.
Instructor in Mathematics, Cascadilla School, Ithaca, N. Y.

WILLIAM L. ROWLAND, S. B., . . *Chemistry*, . . . 1880.
(*Did not enter upon the Fellowship*).

EDWARD H. SPIEKER, PH. D., . . *Greek*, . . . 1880–1882.
Instructor in Greek and Latin, Johns Hopkins University.

MORRISON I. SWIFT, PH. D., . . *Philosophy*, . . 1880–1882.
Instructor in Logic and Political Economy, Hobart College, 1882–84.

ARTHUR W. WHEELER, A. B., . . *Physics*, . . . 1880–1881.
(*Died, January* 6, 1881, *aged* 21 *years*).

R. DORSEY COALE, PH. D., . . . *Chemistry*, . . . 1880–1881.
Professor of Chemistry and Toxicology, University of Maryland.

A. F. WILHELM SCHIMPER, PH. D., . *Biology*, . . . 1880–1881.
Privat-Docent, University of Bonn, Germany.

LAWRENCE B. FLETCHER, PH. D., . *Physics*, . . . 1880–1881.
Instructor in Physics, Wesleyan University, Middletown, Conn., 1882–83.

WILLIAM J. ALEXANDER, PH. D., . *Greek*, . . . 1881–1883.
Professor of English, Dalhousie College, Halifax, Nova Scotia.

EDWARD S. BURGESS, A. B., . . *Greek*, . . . 1881–1882.
Instructor, Washington (D. C.) High School.

WILLIAM J. COMSTOCK, PH. B., . . *Chemistry*, . . . 1881–1882.
Student of Chemistry, University of Munich.

WILLIAM C. DAY, PH. D., . . . *Chemistry*, . . . 1881–1883.
Professor of Chemistry and Physics, University of Nashville, Tenn.

HENRY H. DONALDSON, PH. D., . *Biology*, . . . 1881–1883.
Instructor in Psychology, Johns Hopkins University.

WILLIAM P. DURFEE, PH. D., . . *Mathematics*, . . 1881–1883.
Professor of Mathematics, Hobart College, N. Y.

GEORGE S. ELY, PH. D., . . . *Mathematics*, . . 1881–1883.
Professor of Mathematics, Buchtel College, 1883–84; Assistant Examiner, U. S. Patent Office.

J. FRANKLIN JAMESON, PH. D., . *History*, . . . 1881–1882.
Associate in History, Johns Hopkins University.

C. HERSCHEL KOYL, A. B., . . *Physics*, . . . 1881–1883.
Instructor in Physics, Washington (D. C.) High School.

HENRY L. OSBORN, PH. D., . . *Biology*, . . . 1881–1882.
Professor of Zoölogy, Purdue University, Lafayette, Indiana.

HENRY N. STOKES, PH. D., . . *Biology*, . . . 1881–1883.
Student of Chemistry in Germany.

BENJAMIN W. WELLS, PH. D., . . *English*, . . . 1881.
Instructor in English, Friends' School, Providence, R. I.

BENJAMIN I. GILMAN, A. B., . . *Logic*, . . . 1881–1882.
Student of Philosophy in Europe.

CHARLES J. BELL, A. B., . . . *Chemistry*, . . . 1882.
Professor of Chemistry, Pennsylvania State College, 1882–85; Fellow by Courtesy, Johns Hopkins University. (*Did not enter upon the Fellowship*).

JAMES M. CATTELL, A. B., . . . *Philosophy*, . . 1882–1883.
Student of Philosophy in Germany.

ELLERY W. DAVIS, PH. D., . . *Mathematics*, . . 1882–1884.
Professor of Mathematics and Military Tactics, Florida Agricultural College.

DAVID T. DAY, PH. D., . . . *Chemistry*, . . . 1882–1884.
Johns Hopkins University.

ALFRED EMERSON, PH. D., . . *Greek*, . . . 1882–1884.
Instructor in Classical Archæology, Johns Hopkins University, 1884–85; Fellow by Courtesy, Johns Hopkins University.

WILLIAM S. FLEMING, A. B., . . *Greek*, . . . 1882–1883.
Professor of Greek and German, Davidson College, 1883–85.

ARTHUR L. FROTHINGHAM, JR., PH. D., *Shemitic Languages*, . 1882–1885.
Fellow by Courtesy, Johns Hopkins University; Editor of the American Journal of Archæology.

HENRY R. GOODNOW, A. B., . . *Physics*, . . . 1882–1883.

ELGIN R. L. GOULD, A. B., . . *History*, . . . 1882–1884.
Instructor in History, Washington (D. C.) High School.

ARTHUR S. HATHAWAY, S. B., . . *Mathematics*, . . 1882–1884.
Instructor in Mathematics, Cornell University, N. Y.

WILLIAM H. HOWELL, PH. D., . . *Biology*, . . . 1882–1884.
Associate in Biology, Johns Hopkins University.

ARTHUR L. KIMBALL, PH. D., . . *Physics*, . . . 1882–1883.
Associate in Physics, Johns Hopkins University.

HARRY F. REID, PH. D., . . . *Physics*, . . . 1882.
Student of Physics in Cambridge, England.

EDWARD H. KEISER, PH. D., . . *Chemistry*, . . . 1882–1884.
Associate Professor of Chemistry, Bryn Mawr College, Pa.

WILLIAM M. ARNOLT, B. D., . . *Greek*, . . . 1883–1885.
Fellow by Courtesy, Johns Hopkins University.

GUSTAV BISSING, PH. D., . . . *Mathematics*, . . 1883–1884.
Assistant Examiner, U. S. Patent Office.

ADAM T. BRUCE, A. B., . . . *Biology*, . . . 1883–1884.
Fellow by Courtesy, Johns Hopkins University.

ARCHIBALD L. DANIELS, A. B., . . *Mathematics*, . . 1883–1884.
Instructor in Mathematics, Chicago Manual Training School.

JOHN DEWEY, PH. D., . . . *Philosophy*, . . 1883–1884.
Instructor in Philosophy, University of Michigan.

JAMES R. DUGGAN, M. D., PH. D., . *Chemistry*, . . 1883–1884.
Fellow by Courtesy, Johns Hopkins University.

HANS C. G. VON JAGEMANN, PH. D., . *Modern Languages*, . 1883–1884.
Professor of Modern Languages, Earlham College, Richmond, Ind.

GUSTAV A. LIEBIG, JR., PH. D., . *Physics*, . . . 1883–1885.
Fellow by Courtesy, Johns Hopkins University.

C. W. EMIL MILLER, A. B., . . *Greek*, . . . 1883–1885.
Fellow by Courtesy, Johns Hopkins University.

CHARLES A. PERKINS, PH. D., . . *Physics*, . . . 1883–1884.
Assistant in Physics, Johns Hopkins University.

LEWIS T. STEVENS, A. B., . . . *Biology*, . . . 1883–1884.
Student of Medicine, Harvard University.

LEWIS W. WILHELM, PH. D., . . *History*, . . . 1883–1884.
Baltimore.

HOMER W. HILLYER, PH. D., . . *Chemistry*, . . . 1884–1885.
Assistant in Chemistry, University of Wisconsin.

FREDERIC S. LEE, PH. D., . . . *Biology*, . . . 1884–1885.
Student of Biology in Germany.

CHARLES H. LEVERMORE, A. B., . *History*, . . . 1884–1885.
New Haven, Conn.

HENRY F. NACHTRIEB, S. B., . . *Biology*, . . . 1884–1885.
Assistant Professor of Biology, University of Minnesota, Minneapolis.

HENRY B. NIXON, ... *Mathematics*, . . 1884–1885.
Fellow by Courtesy, Johns Hopkins University.

WILLIAM NOYES, JR., A. B., M. D., . *Psychology*, . . 1884–1885.
Fellow by Courtesy, Johns Hopkins University.

ALBERT G. PALMER, PH. D., . . *Chemistry*, . . . 1884–1885.
Assistant in Chemistry, Swarthmore College, Pa.

ALBERT H. TOLMAN, A. B., . . *English*, . . . 1884.
Professor of English Literature and Rhetoric, in Ripon College, Wisc. (*Resigned before entering on the Fellowship*).

WOODROW WILSON, A. B., . . . *History*, . . . 1884–1885.
Associate in History, Bryn Mawr College, Pa.

ARTHUR MCDONALD, A. B., . . *Psychology*, . . 1885.
(*Resigned before entering on the Fellowship*).

CHARLES B. WRIGHT, A. B., . . *English*, . . . 1885.
Professor of English Literature and Rhetoric, in Middlebury College, Vt. (*Resigned before entering on the Fellowship*).

PRESENT HOLDERS OF FELLOWSHIPS.

CYRUS ADLER, A. B., . . . *Shemitic Languages*, . 1885–
ETHAN A. ANDREWS, PH. B., . . *Biology*, . . . 1884–
DAVID BARCROFT, PH. B., . . . *Mathematics*, . . 1885–
W. SHIRLEY BAYLEY, A. B., . . *Geology & Petrography*, 1885–
LOUIS BELL, A. B., ... *Physics*, . . . 1885–
FRANK A. CHRISTIE, A. B., . . *Greek*, . . . 1885–
HENRY CREW, A. B., ... *Physics*, . . . 1884–
DAVIS R. DEWEY, A. B., . . . *History*, . . . 1885–
ALBERT E. EGGE, A. B., . . . *Teutonic Languages*, . 1885–
WILLIAM H. EMERSON, . . . *Chemistry*, . . . 1885–
JOHN C. FIELDS, A. B., . . . *Mathematics*, . . 1885–
ABEL H. HUIZINGA, A. B., . . *Shemitic Languages*, . 1884–
JOSEPH JASTROW, A. B., . . . *Psychology*, . . 1885–
GEORGE T. KEMP, A. B., . . . *Biology*, . . . 1885–
MARION D. LEARNED, A. B., . . *Modern Languages*, . 1885–
GONZALEZ LODGE, A. B., . . . *Greek*, . . . 1885–
CHARLES S. PALMER, A. B., . . *Chemistry*, . . 1885–
ERNEST M. PEASE, A. B., . . . *Latin*, . . . 1884–
CHARLES WHETHAM, A. B., . . *Romance Languages*, . 1885–

C.

Graduates.

DEGREES CONFERRED HONORIS CAUSA.

1880.

HENRY A. ROWLAND, PH. D., Professor of Physics, Johns Hopkins University.

1881.

RUTHERFORD B. HAYES, LL. D., President of the United States.

DEGREES CONFERRED ON EXAMINATION.

1878.

DOCTORS OF PHILOSOPHY.

HENRY CARTER ADAMS. (F). A. B., Iowa, 1874.—Lecturer on Political Economy, University of Michigan; Associate Professor of Political Economy, Cornell University.

THOMAS CRAIG. (F). C. E., Lafayette, 1875.—Associate Professor of Mathematics, Johns Hopkins University.

JOSIAH ROYCE. (F). A. B., Univ. of California, 1875.—Assistant Professor of Philosophy, Harvard University.

ERNEST GOTTLIEB SIHLER. (F). Concordia, 1869.—Classical Instructor, New York City. (4)

1879.

DOCTORS OF PHILOSOPHY.

MAURICE BLOOMFIELD. (F). A. M., Furman, 1877.—Associate Professor of Sanskrit, Johns Hopkins University.

SAMUEL FESSENDEN CLARKE. (F). Ph. B., Yale, 1878.—Professor of Natural History, Williams College.

GEORGE BRUCE HALSTED. (F). A. B., Princeton, 1875.—Professor of Mathematics, University of Texas.

EDWARD HART. (F). S. B., Lafayette, 1874.—Assistant Professor of Chemistry, Lafayette College.

WILLIAM WHITE JACQUES. (F). S. B., Mass. Inst. of Technology, 1876.—Instructor in Telegraph Engineering, Massachusetts Institute of Technology.

HENRY SEWALL. (F). S. B., Wesleyan, 1876.—Professor of Physiology, University of Michigan. (6)

F. Holders of Fellowships.

BACHELORS OF ARTS.

GEORGE WASHINGTON MCCREARY. Engaged in mercantile pursuits, Baltimore.

CHASE PALMER. (F). Professor of Chemistry, Massachusetts State Normal School.

EDWARD HENRY SPIEKER. (F). Instructor in Greek and Latin, Johns Hopkins University.

(3)

1880.

DOCTORS OF PHILOSOPHY.

FRANCIS GREENLEAF ALLINSON. (F). A. B., Haverford, 1876; A. B., Harvard, 1877.—Late Assistant Professor of Greek and Latin, Haverford College; Classical Instructor, Baltimore.

FABIAN FRANKLIN. (F). Ph. B., Columbian, 1869.—Associate in Mathematics, Johns Hopkins University.

EDWIN HERBERT HALL. (F). A. B., Bowdoin, 1875.—Instructor in Physics, Harvard University.

ALLAN MARQUAND. (F). A. B., Princeton, 1874.—Professor of the History of Art, Princeton College.

WASHINGTON IRVING STRINGHAM. (F). A. B., Harvard, 1877.—Professor of Mathematics, University of California.

(5)

BACHELORS OF ARTS.

THOMAS MILTON BEADENKOPF. Student of Theology, Yale College.

ALLEN KERR BOND. M. D., University of Maryland, 1882.—Physician, Baltimore.

WILLIAM CATHCART DAY. (F). Professor of Chemistry and Physics, University of Nashville, Tenn.

HENRY LAURENCE GANTT. M. E., Stevens Institute of Technology, 1884.—Mechanical Engineer, Baltimore.

EDGAR GOODMAN. LL. B., University of Maryland, 1881.—Attorney at Law, Baltimore.

CARL ECKHARDT GRAMMER. Minister of the Protestant Episcopal Church, Hancock, Md.

ALEXANDER FRIDGE JAMIESON. Instructor, Lawrenceville, N. J.

*EDMUND ALLEN JARVIS. *Died October* 15, 1880, *aged* 22 *years.*

STEWART BRIAN LINTHICUM. LL. B., University of Maryland, 1882.—Attorney at Law, Portland, Oregon.

JOHN HANSON LOWE. LL. B., University of Maryland, 1882.—Attorney at Law, Baltimore.

LEIGH CLINTON MORGAN. Minister of the Protestant Episcopal Church, Brooklyn, N. Y.

NELSON PALMER. Engaged in mercantile pursuits, Baltimore.

THOMAS PETTIGREW. Creswell, N. C.

HARRY FIELDING REID. (F). Assistant in Physics, Johns Hopkins University, 1882-84.—Now Student of Physics in Cambridge, England.

WILTZ RAYMOND STRICKLEN. Minister of the Methodist Episcopal Church, Baltimore.

LEWIS WEBB WILHELM. (F). Baltimore.

(16)

1881.

DOCTORS OF PHILOSOPHY.

LOUIS BEVIER. (F). A. B., Rutgers, 1878.—Instructor in French in Rutgers College.

ROBERT DORSEY COALE. (F). Professor of Chemistry and Toxicology, University of Maryland.

EDWARD ALLEN FAY. A. B., University of Michigan, 1862.—Professor of History and Languages, National Deaf-Mute College.

LAWRENCE BUNTING FLETCHER. (F). A. B., Columbia, 1877.—Instructor in Physics, Wesleyan University, 1882–84.

SAMUEL GARNER. A. B., St. John's, 1871.—Professor of Modern Languages, University of Indiana.

EDWARD MUSSEY HARTWELL. (F). A. B., Amherst, 1873; M. D., Miami Medical College, 1882.—Associate in Physical Training, Johns Hopkins University.

WILLIAM THOMPSON SEDGWICK. (F). Ph. B., Yale, 1877.—Assistant Professor of Biology, Massachusetts Institute of Technology.

CHRISTIAN SIHLER. (F). Concordia, 1866; M. D., University of Michigan, 1871.—Physician, Cleveland, O.

EDMUND BEECHER WILSON. (F). Ph. B., Yale, 1878.—Lecturer on Biology, Williams College, 1883–84; Associate Professor of Biology, Bryn Mawr College, Pa. (9)

BACHELORS OF ARTS.

WILLIAM WILSON BADEN. LL. B., University of Maryland, 1883.—Attorney at Law, Baltimore.

HENRY JOHNS BOWDOIN. LL. B., University of Maryland, 1883.—Attorney at Law, Baltimore.

JOHN WILSON BROWN. Baltimore.

DAVID TALBOTT DAY. (F). Johns Hopkins University.

WILLIAM HENRY HOWELL. (F). Associate in Biology, Johns Hopkins University.

JOHN JOHNSON. Instructor, McDonogh School.

JAMES EDWARD KEELER. Assistant, Allegheny (Pa.) Astronomical Observatory.

EDWIN GEORGE RICHARDSON. Clergyman of the Protestant Episcopal Church, Milwaukee, Wis.

ADONIRAM JUDSON ROBINSON. LL. B., University of Maryland, 1885.—Instructor in Baltimore City College.

HENRY ROLANDO. M. D., University of Maryland, 1883.—Now connected with the Presbyterian Hospital, New York City.

LEE SALE. LL. B., Washington University, 1885.—Attorney at Law, St. Louis, Mo.

MACTIER WARFIELD. M. D., University of Maryland, 1884.—Physician, Baltimore. (12)

1882.

DOCTORS OF PHILOSOPHY.

JAMES WILSON BRIGHT. (F). A. B., Lafayette, 1877.—Instructor in English, Johns Hopkins University.

JOHN FRANKLIN JAMESON. (F). A. B., Amherst, 1879.—Associate in History, Johns Hopkins University.

MITSURU KUHARA. (F). S. B., University of Tokio, 1877.—Lecturer on Organic Chemistry, University of Tokio.

ROBERT W. MAHON. C. E., Lehigh, 1876.—Adjunct Professor of Chemistry, Lafayette College, 1882-83; Chemist, Camden, N. J.

OSCAR HOWARD MITCHELL. (F). A. B., Marietta, 1875.—Professor of Mathematics, Marietta College.

GEORGE FREDERICK NICOLASSEN. (F). A. B., University of Virginia, 1879.—Professor of Ancient Languages, Southwestern Presbyterian University.

WILLIAM ALBERT NOYES. A. B., Iowa, 1879.—Professor of Chemistry, University of Tennessee.

CHASE PALMER. (F). A. B., Johns Hopkins, 1879.—Professor of Chemistry, Mass. State Normal School.

EDWARD HENRY SPIEKER. (F). A. B., Johns Hopkins, 1879.—Instructor in Greek and Latin, Johns Hopkins University. (9)

BACHELORS OF ARTS.

WILLIAM HUGHLETT ADKINS. LL. B., University of Maryland, 1883.—Attorney at Law, Baltimore.

THOMAS ALEXIS BERRY. Graduate Student, Johns Hopkins University.

GUSTAV BISSING. (F). Fellow, Johns Hopkins University, 1883-84.—Assistant Examiner, U. S. Patent Office.

WALTER BERNARD CLARKSON. Principal of the Duval High School, Jacksonville, Fla., 1880-83.

HERMANN LOUIS EBELING. Instructor, Bloomfield, N. J.

LOUIS GARTHE. Baltimore.

EDWARD INGLE. Baltimore.

RICHARD FULLER KIMBALL. LL. B., University of Maryland, 1884.—Attorney at Law, Baltimore.

GUSTAV ADOLPH LIEBIG, JR. (F). Fellow by Courtesy, Johns Hopkins University.

CHARLES WILLIAM EMIL MILLER. (F). Johns Hopkins University.

JAMES PAGE. Baltimore.

ALBERT GALLATIN PALMER. (F). Assistant in Chemistry, Swarthmore College, Pa.

ROBERT MILLER REESE. Engaged in mercantile pursuits, Baltimore.

LEWIS TEBBETTS STEVENS. (F). Student of Medicine, Harvard University.

HERBERT THORNDYKE TIFFANY. LL. B., University of Maryland, 1885.—Attorney at Law, Baltimore. (15)

1883.

DOCTORS OF PHILOSOPHY.

WILLIAM JOHN ALEXANDER. (F). A. B., University of London, 1876.—Professor of English Literature, Dalhousie College, Nova Scotia.

WILLIAM CATHCART DAY. (F). A. B., Johns Hopkins University, 1880.—Professor of Chemistry and Physics, University of Nashville, Tennessee.

WILLIAM PITT DURFEE. (F). A. B., University of Michigan, 1876.—Professor of Mathematics, Hobart College.

GEORGE STETSON ELY. (F). A. B., Amherst College, 1878; Professor of Mathematics, Buchtel College, 1883–84.—Assistant Examiner, U. S. Patent Office.

KAKICHI MITSUKURI. (F). Ph. B., Yale College, 1879.—Professor of Zoölogy, University of Tokio, Japan.

BERNARD FRANCIS O'CONNOR. (F). Bach. ès Lettres, Université de France, 1874.—Instructor in French, Columbia College. (6)

BACHELORS OF ARTS.

WILLIAM SHIRLEY BAYLEY. Fellow, Johns Hopkins University.

MAURICE FELS. Student of Law, Philadelphia.

DAVID STERRETT GITTINGS. Student of Law, Baltimore.

WILLIAM BEATTY HARLAN. LL. B., University of Maryland, 1885.—Attorney at Law, Baltimore.

GEORGE THEOPHILUS KEMP. Fellow, Johns Hopkins University.

GONZALEZ LODGE. Fellow, Johns Hopkins University.

WILLIAM EDGAR STRATTON. Student of Medicine, Harvard University.

HENRY WINSLOW WILLIAMS. LL. B., University of Maryland, 1885.—Attorney at Law, Baltimore.

HENRY VAN PETERS WILSON. Graduate Scholar, Johns Hopkins University.

WILLIAM JOHN WITZENBACHER. Instructor in the McDonogh School. (10)

1884.

DOCTORS OF PHILOSOPHY.

HERBERT WILLIAM CONN. A. B., Boston University, 1881.—Professor of Zoölogy, Wesleyan University, Conn.

ELLERY WILLIAM DAVIS. (F). S. B., University of Wisconsin, 1879.—Professor of Mathematics and Military Tactics, Florida Agricultural College.

DAVID TALBOTT DAY. (F). A. B., Johns Hopkins, 1881.—Graduate Student, Johns Hopkins University.

JOHN DEWEY. (F). A. B., University of Vermont, 1879.—Instructor in Philosophy University of Michigan.

JAMES REYNOLDS DUGGAN. (F). A. B., Mercer University, 1877.—Fellow by Courtesy, Johns Hopkins University.

WILLIAM HENRY HOWELL. (F). A. B., Johns Hopkins, 1881.—Associate in Biology, Johns Hopkins University.

HANS CARL GÜNTHER VON JAGEMANN. (F). Naumburg Gymnasium, 1876.—Professor of Modern Languages, Earlham College.

EDWARD HARRISON KEISER. (F). S. B., Swarthmore, 1880.—Associate Professor of Chemistry, Bryn Mawr College, Pa.

ARTHUR LALANDE KIMBALL. (F). A. B., Princeton, 1881.—Associate in Physics, Johns Hopkins University.

HENRY LESLIE OSBORN. (F). A. B, Wesleyan, 1878.—Professor of Zoölogy, Purdue University, Indiana.

CHARLES ALBERT PERKINS. (F). A. B., Williams, 1879.—Assistant in Physics, Johns Hopkins University.

ALBERT SHAW. A. B., Iowa College, 1879.—Journalist, Minneapolis, Minnesota.

HENRY NEWLIN STOKES. (F). S. B., Haverford, 1879.—Student of Chemistry in Europe.

LEWIS WEBB WILHELM. (F). A. B., Johns Hopkins, 1880.—Baltimore.

ARTHUR YAGER. A. B., Georgetown College, Kentucky, 1879.—Professor of History, Georgetown College, Ky. (15)

BACHELORS OF ARTS.

ALBERT CLAYTON APPLEGARTH. Graduate Student, Johns Hopkins University.

CHARLES WALTER ARTZ. Student of Law, Columbia College.

WALTER BLISS CANFIELD. Graduate Student, Johns Hopkins University.

GEORGE GIBSON CAREY, JR. Student of Law, University of Maryland.

WILLIAM KENNEDY CROMWELL. Student of Law, Harvard University.

CHARLES WILLIAM RAMMELSBERG CRUM. Instructor in Mathematics, Mercersburg College, Pa.

HARRY FRIEDENWALD. Student of Medicine, College of Physicians and Surgeons, Baltimore.

WILLIAM LINDSAY GLENN. Student of Law, University of Maryland.

JOHN HINKLEY. Student of Law, University of Maryland.

CHARLES HOWARD HOWARD. Student of Law, University of Maryland.

JOHN DEERING LORD, JR. Student of Law, Columbia College.

JERE WILLIAMS LORD. Student of Medicine, University of Pennsylvania.

WILLIAM PATRICK LYONS. Student of Law, University of Maryland.

EDGAR GEORGE MILLER, JR. Student of Law, University of Maryland.

WILLIAM RIDGELY ORNDORFF. Graduate Scholar, Johns Hopkins University.

GEORGE DOBBIN PENNIMAN. Student of Law, University of Maryland.

WILLIAM HENRY PERKINS, JR. Student of Law, University of Maryland.

GEORGE CLEMENT STOKES, JR. Baltimore.

WILLIAM JONES THOMAS. (*Deceased, March* 9, 1885).

WILLIAM FERDINAND WALZ. Graduate Student, Johns Hopkins University.

FREDERICK HENRY WILKENS. Student in the University of Berlin, Germany.

GEORGE WISHART EDMOND, (*extra ordinem*). Graduate Student, Johns Hopkins University.

CHARLES HOWARD SHINN, (*extra ordinem*). San Francisco, California. (23)

1885.

DOCTORS OF PHILOSOPHY.

EDWARD WEBSTER BEMIS. A. B., Amherst College, 1880.—Instructor, Minneapolis, Minn.

GUSTAV BISSING. (F). A. B., Johns Hopkins University, 1882.—Assistant Examiner, U. S. Patent Office.

HENRY HERBERT DONALDSON. (F). A. B., Yale College, 1879.—Instructor in Psychology, Johns Hopkins University.

LOUIS DUNCAN. U. S. Naval Academy, 1880.—U. S. Navy.

HOMER WINTHROP HILLYER. (F). S. B., University of Wisconsin, 1882.—Assistant in Chemistry, University of Wisconsin.

FREDERIC SCHILLER LEE. (F). A. B., St. Lawrence University, 1878.—Student of Biology in Germany.

GUSTAV ADOLPH LIEBIG, JR. (F). A. B., Johns Hopkins University, 1882.—Fellow by Courtesy, Johns Hopkins University.

JAMES PLAYFAIR MCMURRICH. A. B., University of Toronto, 1879.—Instructor in Osteology and Mammalian Anatomy, Johns Hopkins University.

ALBERT GALLATIN PALMER. (F). A. B., Johns Hopkins University, 1882.—Assistant in Chemistry, Swarthmore College, Pa.

HARRY FIELDING REID. (F). A. B., Johns Hopkins University, 1880.—Student of Physics, University of Cambridge, England.

HENRY ALFORD SHORT. A. B., Columbia College, 1880.—Fellow of Columbia College.

MORRISON ISAAC SWIFT. (F). A. B., Williams College, 1879.—Ashtabula, Ohio.

HENRY ALFRED TODD. A. B., Princeton College, 1876.—Associate in Romance Languages, Johns Hopkins University. (13)

BACHELORS OF ARTS.

JOHN PENDLETON CAMPBELL. Graduate Scholar, Johns Hopkins University.

JOHN GLENN, JR. Student of Law, University of Maryland.

JUNIUS MOORE HORNER. Graduate Scholar, Johns Hopkins University.

JAMES ALBERT LOANE. Graduate Scholar, Johns Hopkins University.

HARRY WILBUR PRICE. Washington, D. C.

BENJAMIN TITUS ROBERTS, JR. Graduate Student, Johns Hopkins University.

MOSES ROTH RYTTENBERG. Graduate Student, Johns Hopkins University.

HUGO STEINER. Graduate Student, Johns Hopkins University.

HENRY HAZLEHURST WIEGAND. Graduate Student, Johns Hopkins University. (9)

TOTAL (1878-85).

DOCTORS OF PHILOSOPHY, ...	67
BACHELORS OF ARTS, ...	88

D.

Reports on the Studies of the Year.

PREPARED BY THE PROFESSORS AND INSTRUCTORS OF THE SEVERAL DEPARTMENTS.

MATHEMATICS.

The following courses of lectures, etc., have been given during the year:

Professor Newcomb:

Analytical and Celestial Mechanics. *Twice weekly, through the year.*
Seminary. *Weekly, second half-year.*

Dr. Story:

Seminary. *Weekly, through the year.*
Theory of Numbers. *Twice weekly, first half-year.*
Quaternions. *Three times weekly, second half-year.*
Modern Synthetic Geometry. *Three times weekly, first half-year.*
Modern Algebra. *Twice weekly, second half-year.*
Introductory Course for Graduates. *Daily, through the year.*
Conic Sections. *Twice weekly, through the year.*

Dr. Craig:

Seminary. *Weekly, through the year.*
Calculus of Variations. *Twice weekly, first half-year.*
Differential Equations. *Twice weekly, through the year.*
Theory of Functions. *Three times weekly, through the year.*
Hydrodynamics. *Three times weekly, first half-year.*
Linear Differential Equations. *Three times weekly, second half-year.*

Dr. Franklin:

Problems in Mechanics. *Twice weekly, through the year.*
Theory of Equations. *Three times weekly, first half-year.*
Differential and Integral Calculus. *Three times weekly, through the year.*
Solid Analytic Geometry. *Three times weekly, second half-year.*
Analytical Geometry. *Twice weekly, first half-year; three times weekly, second half-year.*
Trigonometry. *Three times weekly, first half-year.*

Mr. Nixon:

Differential and Integral Calculus (specially designed for students of Physics). *Daily, first half-year.*

PHYSICS.

The rooms devoted to the Physical Laboratory have been open daily for the prosecution of study and research, under the direction of Professor Rowland, assisted by Drs. Kimball and Perkins.

A photographic map of the spectrum has been nearly completed, and special preparations have been made for the exact measurement of wave lengths. These preparations have involved the construction of a comparator, a fine micrometer, and a spectrometer with telescopes having six and a quarter inch objectives and eight feet focal length.

The following researches have also been carried on during the year:

The investigation of displacement currents by electro-magnetic means.

The determination of the expansion of water between zero and forty degrees centigrade.

The preparation and study of standard cells.

The measurement of wave lengths of light in absolute measure.

During the month of October a course of twenty lectures on *Molecular Dynamics* was given by Sir William Thomson, D. C. L., F. R. S., &c., Professor of Physics in the University of Glasgow. These lectures were especially intended to develop the mechanics of the molecule in its relations to the luminiferous ether, and were attended by a number of professors and special students of physics from all parts of the country. Stenographic notes of the lectures were taken by Mr. A. S. Hathaway, and have since been written out and published.

Advanced students have taken part with the instructors in weekly meetings for the discussion of the current physical journals.

The following courses have also been carried on during the year:

Professor Rowland:

Lectures on Electricity and Magnetism. *Four times weekly, through the year.*

Dr. Kimball:

First year's course in General Physics. *Daily, through the year.*

Elementary Thermodynamics. *Weekly for eleven weeks.*

Theory of Electricity. *Twice weekly for ten weeks.*

Physical Optics. *Twice weekly for ten weeks.*

Dr. Perkins:

Laboratory work of the undergraduate students throughout the year.

Chemistry.

Advanced students have been engaged daily in the laboratory in prosecuting such work as seemed best adapted to the purposes of each. Those who have completed the full courses in General Chemistry, including from two to three years' work in qualitative and quantitative analysis and about a year's work in making difficult and instructive preparations, were encouraged to undertake the solution of original problems.

The following investigations have been in progress during the year:

On chemical action in a magnetic field.

The effect of pressure on the transformation of a diazo-compound by boiling with alcohol.

The structure of benzoic sulphinide.

On para-brom-benzoic sulphinide.

On the relative stability of halogen derivatives of the paraffins in the presence of an alkali.

A method for the estimation of zinc dust.

An apparatus which enables students to determine the equivalents of certain metals.

An apparatus for distilling mercury in a vacuum.

The results of these investigations have either been already published or will soon appear in the *American Chemical Journal*. Some of them have been read before the Johns Hopkins Scientific Association at its regular meetings.

The Fellows and other advanced students have met the instructors twice a week during the year for the purpose of keeping abreast of the current

chemical literature. All the important journals have been carefully read, and full reports of the various articles have been made.

These students have been often called upon to treat important chemical questions in a broad way, going to the original sources and presenting the results in a complete form. In most cases the topics so investigated have been connected with the experimental work going on at the time; but other questions also have been elaborated in this way, which bore less directly on the current studies. In several cases carefully written reports of the results obtained have been prepared. The excellent library of chemical books and journals which is accessible to the students in the laboratory, at all reasonable hours, has greatly facilitated the execution of this very desirable literary work.

At the beginning of the year subjects were assigned to the Fellows and others for the preparation of lectures on various chemical topics treated historically; and sixteen such lectures were the result. These were prepared from a careful study of the original articles in the journals and were not borrowed from books on the history of chemistry. Full abstracts of these lectures, furnished with complete references to the articles consulted, are to be prepared and preserved in the chemical library. The lectures given were as follows:

Two by Professor Remsen on The Basicity of Acids;
One by Dr. J. R. Duggan on Disinfecting Agents;
One by Mr. W. S. Bayley on The History of Uric Acid;
Two by Dr. D. T. Day on Dissociation;
One by Mr. C. S. Palmer on The Proust-Berthollet Controversy;
Two by Dr. Morse on The History of Phosphorus;
One by Mr. A. G. Palmer on Isomerism in the Benzene Series;
One by Mr. H. W. Hillyer on Homology;
Two by Dr. E. H. Keiser on The History of Pyridine and Quinoline.

These lectures were attended by an average of twenty-five persons including the instructors.

In addition, the work of the year has consisted of the courses below mentioned:

Laboratory Work through the entire year, conducted by Professor Remsen, Dr. Morse and Dr. E. H. Keiser.

Lectures by Professor Remsen:
General Chemistry, *daily, first half-year.*
Chemistry of the Compounds of Carbon, *daily, second half-year.*
Chemical Philosophy, *twelve lectures, first half-year.*

Courses by Dr. Morse:
Analytical Chemistry, *four times weekly, first half-year.*
General Chemistry, *three times weekly, second half-year.*

MINERALOGY AND PETROGRAPHY.

Courses of lectures have been given by Dr. G. H. Williams on:

Inorganic Geology, Petrography, and General Mineralogy. *Three times weekly.*
Elementary Mineralogy, *twice weekly, second half-year.*

Daily laboratory instruction has also been given in microscopical petrography and physical mineralogy.

Frequent excursions have been made and considerable material for a geological map of the vicinity of Baltimore has been brought together; much information as to the number and range of the minerals occurring within this district has also been collected.

Special and detailed microscopic studies have been made of the basic massive rocks (hypersthene- and olivine-gabbros and peridotites) occurring near Baltimore, as well as of the molecular and chemical changes which these have undergone.

Considerable microscopic work has also been done on the interesting massive rocks occurring near Peekskill, N. Y., which have been called by Prof. J. D. Dana the "Cortlandt Series."

Biology.

The Biological Laboratory has been open for eight hours daily during the year, for the prosecution of advanced study and research and for courses of practical instruction in connection with class lectures.

During the year original investigations have been made in regard to the following subjects:

The proteids of blood plasma. The influence of intermittent pressure on arterial tonicity. The influence of various salts on arterial tonicity. The absolute relative value of commercial disinfectants and germicides. Regeneration of tissue in larvæ. The rate of propagation of the wave of muscular contraction. The proximate cause of the coagulation of blood. The functions of the cardiac nerves of the Chelonia. The nature of apnœa. The embryology of Echinoderms. The conditions which determine sex. The embryology of insects. The segmentation of the vertebrate skull. The homology of the hypoglossus nerve.

Preliminary notices of the results of most of the above researches have already been printed in the *University Circulars*, in the *Zoologischer Anzeiger* and elsewhere. Fuller accounts will shortly be published.

In connection with the regular class instruction, first year students studied a number of typical fungi, green plants, and animals; the skeletons of about twenty selected vertebrates; and the development of the chick in the egg. In the spring there were twelve practical lessons in the elements of Systematic and Descriptive Botany.

Second year students worked at the histology of the tissues and organs of the higher vertebrata (especially man); the physiological properties and functions of the tissues and organs; the physiology of digestion; the chemistry of bile, urine, etc. The cat and about twenty-five selected invertebrate and vertebrate types were thoroughly dissected by the second year students.

Dr. W. K. Brooks lectured twice weekly through the year on Advanced Morphology.

A course of seven lectures on Morphological Problems was given during April and May, as follows:

Three by Mr. E. A. Andrews on the Anatomy, Embryology, and Affinities of Annelids;
One by Dr. J. Playfair McMurrich on the Morphological Significance of the Hypoglossus Nerve;
One by Mr. A. T. Bruce on the Embryology of Insects;
One by Mr. Otto Lugger on Galls;
One by Dr. W. K. Brooks on Alternation of Generations.

A course of six lectures on Animal Teratology was given by Dr. W. T. Councilman during May.

Most of the advanced work was carried on individually, and not in class; each worker taking up some special topic for study under the immediate direction of some one of the instructors. In addition to the original researches already enumerated, certain graduate students have in this manner carried on advanced study in various directions.

Students engaged in this kind of study (which forms a stepping-stone between class-work and original research), are usually given some important original article, and shown how to repeat and verify for themselves (and

criticise) the experiments and results described in it. By studying and repeating the original work of others they learn the methods of biological investigation, and are thus trained to plan and carry out researches themselves. In connection with this work, students are also taught how to hunt up and utilize the bibliography of a subject.

Courses of lectures for undergraduates were given as follows:

Osteology, *twice weekly, until the end of March.*
Mammalian Anatomy, *twice weekly, until Christmas.*
Animal Physiology and Histology, *three times weekly, through the year.*
General Biology, *three times weekly, until the end of March.*
General Zoölogy, *from Christmas to end of the year.*
Embryology of the Chick and Mammal, *three times weekly, from the first of April until the close of the session.*
Plant Analysis, *twice weekly, in April and May.*

During the summer of 1885, the Chesapeake Zoölogical Laboratory for the study of forms of marine life was open at Beaufort, N. C., from May 23 to Sept. 15.

The advanced work included original investigations on the following subjects:

The embryology of Limulus polyphemus; the chemical composition and coagulation of the blood of Limulus polyphemus, Callinectes hastatus, and Cucumaria sp.; the presence of haemoglobin in the Echinoderms; the existence of a post-oral band of cilia in Gasteropod Veligers; the rhythm and innervation of the heart of the Sea Turtle; the physiology of the heart of the Alligator; the cardiac rhythm of Fishes and the action on the same of certain drugs and poisons; origin of the endoderm in Lepidoptera; the artificial propagation and cultivation of Oysters in floats; the Stomatopoda.

GREEK.

Under the direction of Professor Gildersleeve the advanced students of Greek have been organized into a Greek Seminary. According to the plan of the seminary, the work of each year is concentrated on some leading author or some special department of literature. During the past year the work has been in the Attic Orators.

In the seminary proper, which met twice a week during the academic year, the orators chiefly studied were Antiphon, Andokides, Lysias, Isaios, and Demosthenes. Especial attention was paid to the development of language and style and to the antique canons of aesthetic criticism. The members were required to furnish in turn exegetical and critical commentaries on select portions of the orators, to make analyses of speeches and abstracts of rhetorical treatises.

Of the investigations carried on may be noted: The phraseology and syntax of the fifth oration of Antiphon, the style of Andokides' third as compared with the first and second orations, Thrasymachos of Kalchedon, comparative study of the Trapezitikos and Aiginetikos of Isokrates, synonyms in the orators, the use of the participle in Greek lyric poetry, on the language of the oracles especially in Herodotos, special studies in the vocabulary of Dionysios.

The work of the seminary was supplemented by the study, with critical exercises, under the guidance of the Director, of the rhetorical works of Dionysios of Halikarnassos, and by a course of lectures on the History of Greek Oratory.

Besides the seminary course proper, Professor Gildersleeve delivered twenty-three lectures on Greek Syntax, conducted twenty-two exercises in

translating at dictation from Greek into English and English into Greek, and gave a course of twenty lectures on Lyric Poetry. He also conducted a series of sixteen conferences in Greek Grammar for undergraduates.

Mr. Harris conducted class courses in New Testament Greek (three times weekly, first half-year, and five times weekly, second half-year), and in Sub-Apostolic Literature (three times weekly through the year); and gave a course of eight public lectures on the Perpetuation of Ancient Manuscripts.

Classes were conducted by Dr. Emerson in Classical Archæology (weekly through the year), in the Attic Judicial System (weekly, second half-year), and in the History of Ancient Art (twice weekly, second half-year).

Additional courses were conducted by:

Professor C. D. Morris, in

Plato, *Gorgias, four times weekly, first half-year.*
Aeschylus, *Persae;* Euripides, *Iphigenia in Tauris, three times weekly, second half-year.*
Reading at sight.

Dr. Spieker, in

Isocrates, I, IV; Xenophon, *Hiero, four times weekly, first half-year.*
Homer, *Iliad*, XVI-XVII; Euripides, *Hercules Furens, four times weekly, second half-year.*
Classes in Greek Prose Composition were also conducted by each of the instructors in connection with the courses above named.

Students have privately read for examination the following books:

Herodotus, *Merry's Selections*, (6).
Homer, *Odyssey*, XXI-XXIV, (6).
Xenophon, *Oeconomicus*, (7).
Plutarch, *Themistocles, Cicero*, (6).

Latin.

The Latin Seminary, under the direction of Dr. Warren, held two sessions a week throughout the year, the authors forming the centre of work being the Roman Satirists, especially Horace and Juvenal.

Some of the Fragments of Lucilius were read and discussed, select Satires of Horace and Juvenal were interpreted by the members of the Seminary, in turn, and papers were read by them embodying the results of special studies. Among the subjects thus treated were Juvenal's use of the gerund and gerundive; words borrowed from the Greek used by Horace and Juvenal; the use of the conjunction *cum* in Juvenal; the conditional sentence in Juvenal; the *sermo familiaris* as seen in Lucilius, Horace, Persius, Juvenal, and Petronius; the use of certain suffixes in Plautus, Terence, Lucilius, Horace, Persius, and Juvenal; the future active participle in Juvenal; the position of adjectives with respect to their substantives in Horace; the so-called Sulpiciæ Satira; the use of the preposition *de* in Juvenal; the differences existing between the Satires and other works of Horace; some peculiarities of the Horatian Hexameter based upon statistics collected by members of the Seminary.

In connection with the Seminary work, Dr. Warren gave a course of weekly lectures during the first half of the year on the Roman Satirists. In the latter half of the year Dr. Warren conducted a weekly course of Practical Exercises in Latin.

Additional courses have been conducted during the year by:

Dr. Warren, in

Plautus, *Mostellaria*, and Terence, *Andria, three times weekly, first half-year.*
Tacitus, *Agricola, Germania, Annals*, I, *three times weekly, second half-year.*
Reading at sight, *weekly, throughout the year.*

Professor C. D. Morris, in

Cicero, *de Oratore* I, *Tusculan Disputations* I, *three times weekly, first half-year.*
Catullus and Martial, *Select Poems, three times weekly, second half-year.*
Reading at sight, *weekly, throughout the year.*

Dr. Spieker, in

Livy, II, III, *four times weekly, first half-year.*
Horace, *Select Odes, Satires, and Epistles, four times weekly, second half-year.*
Classes in Latin Prose Composition, meeting weekly, were also conducted by each of the instructors in connection with the courses above named.

Students have privately read for examination the following books:

Cæsar, *Bellum Civile*, (9).
Cicero, *de Senectute*, (1); *de Amicitia*, (9); *Tusculan Disputations*, II, (2); *Orator*, (2).
Horace, *Epodes, Carmen Saeculare*, (12).
Livy, V, VI, (1).
Ovid, *Fasti*, I, II, (12); *Selections*, (1).
Plautus, *Captivi*, (3).
Pliny, *Select Letters*, (2).
Tacitus, *Agricola, Germania*, (1); *Histories*, I, (1); *Annals*, III, IV, (6), IV, V, (1).
Terence, *Phormio*, (3).

SHEMITIC LANGUAGES.

The work of the past year was essentially a continuation of the courses begun during the session 1883–84. For beginners the only course given was in elementary Hebrew. The course in the elements of Biblical Aramaean presupposed a thorough knowledge of Hebrew. The Shemitic studies again centred in the Old Testament on which at first five, and later four, lectures a week were given.

In the *Hebrew course for beginners* the essential elements of the grammar were acquired (after Gesenius-Kautzsch's Hebrew Grammar translated by E. C. Mitchell) and then the reading of the Pentateuch was entered upon.

In the *Hebrew Exercises* about forty chapters from the historical books of the Old Testament were read at sight: Exodus, 16; Genesis, 11 and 12; Jonah, 1 and 3; Job, 1 and 2; Exodus, 3 and 4; Judges, 19 and 20; 2 Samuel, 11; Numbers, 22; Judges, 11; 1 Kings, 17; Exodus, 31 and 32; 2 Kings, 19–21; Deuteronomy, 34, and Joshua, 1–2; Nehemiah, 1 and 2; Jeremiah, 37 and 38; 1 Samuel, 13; 1 Kings, 12 and 13; 1 Chronicles, 10, and 1 Samuel, 31, and 2 Samuel, 1; 2 Samuel, 12; Judges, 6; Ruth, 1 and 2; 1 Kings, 1 and 2; Nehemiah, 8 and 9.

In the *Critical Interpretation of Selected Psalms*, Psalms, 23 and 1, and especially the fifteen post-exilic so-called Songs of degrees (Ps., 120–134) Hebrew *Shîrê hamma'alôth*, *i. e.*, the Songs of the Return (from exile) were thoroughly explained and critically analyzed, with special attention to textual criticism, date of authorship, and constant comparison with the ancient versions of the Psalter.

In the course in the *Elements of Biblical Aramaean* the forms were studied after the paradigm-tables in Baer and Delitzsch's edition of *Libri Danielis, Ezrae et Nehemiae* (Leipzig, 1882) and the first chapters of the book of Daniel read. This course was especially intended as a preparation for the study of Syriac.

In *Arabic* there was read the anecdote of a man of Baghdâd and his slave girl from the *Kitâb tazyîn el-aswâq* (Kosegarten's *Chrestomathia Arabica*, p. 22; Petermann, *Brevis linguae Arabicae grammatica*, p. 33; cf. Lane, *The Thousand and One Nights*, Vol. III, p. 524), and then extracts from the Travels of Ibn Baṭûṭah in the first volume of the Beyrut Arabic Chrestomathy *Majânî-el-adab* (Beyrut, 1883, Imprimerie Catholique); No. 302, The sheikh Abdallah and the elephants; No. 309, The wagons in the Crimean (*Qifjaq*) Steppes; No. 313, Ibn Baṭûṭah's journey to the city of Bolgary; No. 344, Ermine and Sable; No. 320, Meteorites, and finally No. 314, Ibn Baṭûṭah's journey to China and his suffering in captivity. In addition the class met two hours weekly to read easy Arabic

texts at sight, under the guidance of Dr. A. L. Frothingham, Fellow in Shemitic Languages; selections from the Chronicles of Abulfaraj, fables, anecdotes, etc., were read.

In *Ethiopic* the whole book of Baruch in Dillmann's *Chrestomathia Aethiopica* was explained. This was preceded by a series of lectures on the grammar of the Geez language.

In *Assyrian* a course of lectures was first given on Comparative Assyrian Grammar, after which the cuneiform account of the campaign against the Arabians in the Annals of King Sardanapalus (B. C. 668–626) was studied. This was read and explained from beginning to end (V R. 7, 82–10, 5).

In *Sumero-Akkadian* the Syllabaries and Vocabularies in the first part of Haupt's *Keilschrifttexte* were finished, besides the Akkadian Incantation No. 9, and the Sumerian Penitential Psalms No. 14 in Haupt's *Texts*, and finally the Sumero-Akkadian Family Laws (V R., 24).

All the courses were one hour a week through the year with the exception of Elementary Hebrew, Ethiopic, and Assyrian, to which in turn two hours a week were devoted.

Sanskrit and Comparative Grammar of the Cognate Languages.

During the session the following courses were conducted by Dr. Bloomfield:

1. *Elementary Sanskrit.* The most essential elements of the grammar of the classical language were acquired in as short a time as possible, and then the students were brought face to face with the language, learning its structure and laws, not in the abstract, but in its living body. This course served especially, as was found by practical experience, to furnish the students with a knowledge of grammatical analysis, clearer and more exact than that which they bring with them from other philological pursuits. This is due partly to the unrivalled transparence of the structure of the language, and partly to the tradition which has kept alive a close bond between Sanskrit and Comparative and Historical Grammar. Five books of the *Nala* and about a dozen selections from the *Hitopadeça* (both in Lanman's Reader), were read and thoroughly analyzed.

2. A second class in Sanskrit was conducted through a rapid course of reading in the *Hitopadeça* and *Kathâsaritsâgara*.

3. The advanced class in *Vedic Sanskrit* began with a short course in the *Brâhmanas*, restricting themselves to the characteristic selections in Lanman's Reader, which were thoroughly analyzed. The greater part of the year was devoted to an introduction into the *sûtra*-literature, and the relation of the *sûtras* to the hymns of the *saṁhitâs*. Selections from *Âçvalâyana's gṛhyasûtras*, including the hymns cited in them, were read, and their bearing upon Indian life and literature in general was discussed. A series of selections from the law book of *Manu* closed the work of the year.

4. A course in the *general principles of Comparative Philology* was carried on throughout the year. It was introduced by twelve lectures on the leading questions of Indo-European Comparative Grammar (*phonetic law and analogy, agglutination, the questions attaching themselves to the relationships of languages*, etc.). During the remainder of the year Professor Whitney's "Language and the Study of Language" was made the basis of instruction, but this was constantly supplemented by lectures, which aimed to advance the subjects treated in the book up to the present day.

5. A course in *Comparative Grammar of Greek.* This was devoted especially to a detailed exposition of the latest theories on *Indo-European vocalism*, and to a practical application of them to the body of the Greek language. Incidentally other important chapters of Greek Grammar, especially the *guttural series of consonants* and *questions on accentuation*, were treated. The most important phenomena in the vocalism of the principal related languages, Latin, Gothic, and Sanskrit, were also presented.

German.

Dr. Wood conducted the following advanced courses:

Gothic. *Twice weekly, first half-year.* The selections from Ulfilas in Braune's grammar were read and explained. A historical and critical introduction to the study was given, together with four lectures on the history of the Gothic declensions, and four on Gothic syntax.

Old High German. *Weekly, first half-year; twice weekly, second half-year.* The following parts of Braune's reader were read: Nos. 4, 5, 9, 16 (Tatian), 17 (the Strassburg Oaths), 28 (Hildebrandslied), 29, 30 (Muspilli), 31, 33, 34, 35, 36, 39, 40, 41, and part of 32 (Otfrid). Seven lectures were given on the High German Mutation of Consonants.

Middle High German. *Weekly, through the year.* Paul's Grammar (second edition) was used. Selections (about half) from Walter von der Vogelweide (Wilmann's second edition), and one-third of Hartmann's *Iwein* (ed. Benecke-Lachmann) were read. Four lectures were given on Middle High German Metre.

German Comparative Grammar. (Lectures). *Weekly, second half-year.*

The undergraduate courses were conducted by Dr. Wood and Mr. Hempl, as follows:

Major Course:

German Literature. Lectures. *Weekly.* DR. WOOD.

Goethe: *Hermann and Dorothea; Faust I. Twice weekly.* MR. HEMPL.

Selected Readings. Masius. *Lesebuch III. Weekly.* DR. WOOD.

Prose Composition. *Weekly.* DR. WOOD.

Exercises in German Style. *Monthly.* DR. WOOD.

Minor Course:

Lessing: *Minna von Barnhelm, Prosa.* Goethe, *Prosa.* (*Two sections*). *Twice weekly.* MR. HEMPL.

Selected Readings. Oltrogge; *Lesebuch II.* (*Two sections*). *Twice weekly.* DR. WOOD and MR. HEMPL.

Prose Composition. *Weekly.* MR. HEMPL.

Oral Practice. *Weekly.* DR. WOOD.

A class in German conversation was conducted by Dr. Gerber, daily, through the year.

Supplementary Classes:

First Section: Brandt's Grammar, Deutsch's Reader. Schiller: *Lied von der Glocke* (ed. Otis). *Three times weekly.* MR. HEMPL.

Second Section: Otis: Elementary German. Ludwig: *Schloss Heimburg. Five times fortnightly.* MR. HEMPL.

ENGLISH.

Advanced courses were conducted as follows:

Anglo-Saxon: Béowulf. *Weekly.* DR. WOOD. Seven lectures on Germanic Mythology were given with this course.

Anglo-Saxon Grammar. Lectures. *Twice weekly, during March, April, and May.* DR. J. W. BRIGHT.

Additional classes, including the first and second year's courses for undergraduates were conducted as follows:

The minor (first year's) course was directed by Dr. Browne. The first half-year of this course was devoted to the Elizabethan writers. The work included a study of the period and its influences, the prose-writers, lyrists, and allegorical writers, and the rise and development of the drama. Shakespeare's *Julius Cæsar* (Clark and Wright's edition) was carefully studied as class-work. The later Elizabethan drama was illustrated by Webster's *Duchess of Malfy*, and Fletcher's *Rule a Wife*. Abbott's *Shakespearian Grammar* was recommended for reference. The second half-year was employed in the study of fourteenth century literature. Texts studied in class were Chaucer, *Nonne Prestes Tale* (ed. Morris) and Langland, *Piers the Plowman*, Passus 1–3, 5–6 (Skeat's edition), and the period was further illustrated from Wyclif, the pseudo-Chaucer, and *Pierce the Ploughman's Crede.*

The major (second year's) course included instruction in Anglo-Saxon with Mr. C. B. Wright, twice weekly, through the year; Sievers' *Grammatik*, Sweet's *Reader*, and Cynewulf's *Elene* (ed. Zupitza) were used as text-books. Mr. A. E. Egge also conducted a class in Early English, twice weekly, through the year; Skeat's *Tale of Gamelyn*, and Morris's *Specimens of Early English, Part I*, were read.

The work in English done in the P. H. E. course (required of all undergraduates) was conducted by Dr. Browne and was directed with the view of giving the matriculates a sound general conception of the whole body of English literature from the earliest times down to the present century. No manual was used, the students being brought into contact with the original texts, except in the case of writers earlier than the fourteenth century, where the examples selected for illustration were modernized by the instructor. The class read aloud, under the instructor's guidance, Chaucer's *Prologue* and *Knightes Tale* (Morris's edition), and Shakespeare's *Hamlet*. The ground covered by the course extended from *Bëowulf* to Burke.

Courses of public lectures were given on:

English Poetry and the Poet Gray, by Mr. Edmund Gosse. (8).

Shakespeare, by Professor Hiram Corson. (20).

Phonetics, by Mr. A. Melville Bell. (7)

Shakespeare Bibliography, etc., by Mr. Justin Winsor. (2).

Shakespeare (Readings), by Mr. D. C. Bell. (2).

A Shakespeare Circle was formed under the general guidance of Dr. Browne and Dr. Wood, and held several conferences through the session.

Romance Languages.

Advanced courses were conducted as follows:

The Romance Seminary, under the direction of Mr. Elliott. *Two hours a week through the year.*

The work was concentrated on three of the earliest Old French monuments, namely, the *Cantilène de Sainte Eulalie, Fragment de Valenciennes* and part of the *Passion du Christ*. The examination of these texts was on MS. fac-similes and bore upon both matter and form. In addition to it a Seminary meeting was held once a week in which all special students of this department took part.

Introduction to Old French Philology. *Aucassin et Nicolète* was critically studied with special reference to its phonology and morphology as compared with the Classic Latin, on the one hand, and with the Modern French on the other. *Weekly through the year.*

Wallachian:—The whole of Cionca's *Practische Grammatik der rumänischen Sprache* was worked through and short poetical extracts read from Alexandri, Alesandrescu, Muresianu and Sionu. *Weekly, second half-year.*

Lectures:—(*a*) On the Langue d'Oïl Dialects. The object of this course was to give the leading characteristics of the chief dialect groups that constitute the North French.

(*b*) The History of Romance Studies in Europe. *Weekly.*

(*c*) Comparative Romance Phonology. *Weekly.*

(*d*) Modern French Phonetics. *Weekly.*

(*e*) The History of the Past Participle in French. *Three Lectures.*

The undergraduate courses were as follows:

The students of the French Major Course read with Dr. Todd: In Bartsch's Chrestomathie, the selections from *Les plus anciens monuments, St. Alexis, Amis et Amiles, Bestiaire de Philippe de Thaün, Mystère d'Adam, Tristran, Roman de Rou, Contes del Graal, Sermon de Saint Bernard, Roman de Renart, Roman de la Rose, Villehardouin, Froissart, Philippe de Comines, Percefforest;* and the whole of the Oxford text of the *Chanson de Roland.*

Dr. Todd also gave, in this course, seven lectures on the French Literature of the Middle Ages.

The students of the French Minor Course read with Dr. Todd: *Le Voyage autour de ma Chambre* by Xavier de Maistre, *Les Jumeaux de l'Hôtel Corneille* by Edmond About, *Les Mésaventures d'un Ecolier* by Töpffer, *Le Barbier de Séville* and the *Lettre critique sur le Barbier de Séville* by Beaumarchais, and *Hernani* by Victor Hugo. Twenty-minute talks on French Literature upon the basis of Saintsbury's *Primer* have been given in connection with the above readings; with Mr. Bowen they read 110 pp. of Montesquieu, *Grandeur et Décadence des Romains*, 75 pp. of Masson, *French*

Classics, Vol. VII., (Memoirs of 17th Century); 100 pp. of Milne-Edwards, *Précis d'Histoire Naturelle*, and in connection with this, studied 150 pp. of Breymann's *French Grammar;* with Mr. Fontaine they studied and prepared written exercises on the whole of Part I. and fifty *thèmes* of Part II. in Chardenal's Exercises for Advanced Pupils.

Mr. Fontaine met the students of the Minor Course five times weekly for French conversation with systematic instruction and drill in pronunciation.

Dr. Todd has conducted special courses in Italian, Spanish, Catalan, Old Provençal Modern Provençal, and Portuguese:—The class in Italian have read the following authors. Goldoni: *Gl' Innamorati;* Manzoni: *I Promessi Sposi* (one hundred pages); Machiavelli: *Istorie Fiorentine* (second book); selections from Leopardi; and a short *Storia della Letteratura Italiana.* Exercises in grammar have been given twice weekly in connection with the above.

The class in Spanish read the following: Knapp's Spanish Readings (one hundred and fifty pages); *El Barómetro* (comedia); *Don Quijote* (ten chapters); and 1200 verses of the *Poema del Cid* (XII Century). Exercises in grammar were given twice weekly.

In Catalan the *Cronaca* of Ramon Muntaner, Chapters VI. to XXVII. (Cardona's *Dell' Antica Letteratura Catalana*), was read.

In Old Provençal were read the *Poème sur Boëce;* selections from *Girart de Rossilho*, from the poetry of Marcabrun, Bernart de Ventadorn, and Peire d'Alvernhe; and all the prose of Bartsch's Chrestomathie. In Modern Provençal, three cantos of Mistral's *Mirèio* were critically studied.

The class in Portuguese have read three cantos of Camoen's *Lusiads*, and numerous selections from Braga's *Antologia Portugueza*, covering the most ancient period of the language.

Ten public lectures on Romance Literature were given in Hopkins Hall. Three of these by Dr. H. A. Todd, on *Contemporary Spanish Literature*, embraced: I, Contemporary Poetry in Spain; II, The Modern Spanish Novel; III, The Orators and Drama of Modern Spain. Seven lectures, by Associate Professor Elliott, on *Camoens*, covered: I, II, Sketch of Portuguese History to the Death of Camoens; III, Life of Camoens; IV, Minor Works of Camoens; V, VI, The Lusiads; VII, Camoens at Home and Abroad in the Nineteenth Century.

Two public courses on French Literature, including twenty-five lectures and readings (in French) were given by M. Rabillon.

HISTORY AND POLITICAL SCIENCE.

The Seminary of History and Politics, under the direction of Dr. H. B. Adams, has met once a week during the past academic year, each session occupying two hours. Attention has been confined to select topics of American Institutional and Economic History.

Dr. Adams conducted a class course for graduates in the History of Politics, three hours a week through the year.

The course consisted of (1) lectures by Dr. Adams, upon Greek, Roman, and Mediæval Theories of Politics, supplemented by student-reports on Modern Political Theories; (2) oral examinations upon Greek politics, historically considered; (3) lectures upon Modern European Politics, supplemented by the exposition of Bluntschli's *Lehre vom Modernen Stat.*

To undergraduates, Dr. Adams gave the following courses of instruction:

1. Fifteen introductory lectures on Ante-Classic History, with Keary's Dawn of History and Clodd's Childhood of Religions for text-books.
2. Two hours a week through the year on Church History in its relations to the Roman and German Empires, followed by lectures on the Italian Renaissance. The text-books employed were Ploetz's Epitome of Mediæval History and Bryce's Holy Roman Empire, with required readings in Gibbon's Decline and Fall of the Roman Empire

and Milman's Latin Christianity. Two historical essays were required from each member of the class.

3. Two hours a week through the year on the History and Elements of International Law, a course consisting of lectures, the exposition of Bluntschli's *Moderne Voelkerrecht der Civilisirten Staaten*, and reports by members of the class upon international topics. This course, with Dr. Jameson's three hours a week on the English and American Constitutions, constituted the second year in Politics.

Dr. R. T. Ely gave the following courses to graduate students:

1. Two lectures a week on Finance and Taxation. This course comprised an exposition of the general principles and history of money, banking, and finance, also the special subject of taxation in the Cities and States of the American Union, and a sketch of the financial history of the United States. Papers were prepared by members of the class, and class discussion was continually encouraged.
2. One lecture was given each week throughout the first half-year on the principles and historical growth of Commerce. It is hoped that this course will lead to original investigations in the History of American Commerce.
3. One lecture weekly was given throughout the second half-year on methods of Administration in England, Germany, and France. The special subjects treated were the organization of government, bureaucratic and self government, economic functions of government, sanitary legislation, poor laws, appointment and tenure of office, etc.

To undergraduate students, Dr. Ely gave a course of class instruction, five hours a week through the year.

This comprised the first year in the course on Political Science. The first term was devoted to the Elements of Political Economy; the second, to the History of Political Economy. Essays upon assigned topics were required from all members of the class.

Dr. J. F. Jameson conducted class courses as follows:

1. In Physical and Historical Geography (twenty exercises); in the History of Greece down to the time of the Roman conquest, and in the History of Rome and of the Roman Empire down to the fifth century A. D., two hours weekly through the year. The text-books employed were Tozer's Classical Geography, Fyffe's Greece, and Leighton's Rome.
2. In the History of France and England, employing as text-books the Student's History of France and Green's Short History of the English People. Three essays were required. This course, three hours weekly through the year, was in connection with Dr. Adams' class course of two hours a week on Church History, German Empire, and the Italian Renaissance.
3. In the second year's course in Politics, devoting three hours a week to the Constitutions of England and the United States, and using for that purpose two volumes in the English Citizen Series,—Walpole's Electorate and Legislature and Traill's Central Government,—also Bagehot's treatise on the English Constitution, and selections from the principal authorities upon the Constitutional Development of the United States.

Psychology, Pedagogics, History of Philosophy, etc.

Professor G. Stanley Hall lectured twice weekly through the year on Psychology.

This course was in the main a continuation of the course begun the previous year, which was on the psycho-physics of the senses. The lectures began by describing the recent methods and results in the study of instinct. The topics of psycho-genesis, disorders of speech, illusions, the psychological aspects of insanity, localization studies in spinal cord and brain, psycho-physic time and the time sense, apperception and will, and psychological anthropology, were treated with charts, illustrations and literature.

Four students were engaged in original psycho-physic research, the results of which will be made public in due time.

Two weekly conferences were held by Professor Hall during the last half-year, one devoted to ethics, and the other to scientific topics in psychology.

Professor Hall lectured once weekly through the year on Education.

Student life and societies and customs in the middle ages introduced the history of the Italian, French, English and German universities, their organization and legislation, courses of study, &c. Then followed a sketch of the development of primary and secondary State and private schools, their organization, relation to the State, courses of study, with a detailed account of the work in a typical gymnasium, real-school, and French and English schools of a similar grade. The educational ideas of Comenius, Sturm, Locke, Montaigne, Herder, Pestalozzi, Rousseau, Kant, Niemeyer, Schwartz, Graser, Schleiermacher, Herbart, Waitz, Beneke, and contemporary writers were epitomized. The development of modern methods in a few cardinal branches of common school study was given with many illustrations. The history of English and Prussian school legislation was outlined, and the unfoldment and present condition of industrial education in the different countries was sketched Classical, female, professional education, were treated historically, and the course concluded with an account of the institution and philosophical ideals of education in ancient Greece.

A course of twelve lectures on educational topics was given on Saturday mornings to a company of about one hundred graduate students. Lectures were given by President Gilman, and by these members of the academic faculty: Messrs. Hall, Newcomb, Bloomfield, Brooks, Craig, Elliott, Ely, Harris, Hartwell, Story, and Warren.

A few lectures were given by Professor Hall on Mental Hygiene to the undergraduate students.

Professor G. S. Morris gave the following courses:

History of Philosophy in Greece. *Twice weekly, first half-year.*

Topics involved:—The beginnings of science. Anticipations of the modern doctrine of development. Establishment of elementary conceptions of physical science. First application of mathematical conceptions to the comprehension of the universe. Beginnings of abstract speculation. First successful development of concrete or substantial idealism, including science of method (logic), and philosophy of nature, man, the State, art, and education. Systems of practical philosophy.

Ethics, or the Science of Man. *Two lectures weekly, first half-year.*

A consideration of the foundations and content of ethical science, together with an historical survey.

E.

Report of the Chesapeake Zoölogical Laboratory.

SESSION OF 1885.

To the President of the Johns Hopkins University:

SIR: In accordance with your request, I have the honor to submit to you the following report of the eighth session of the marine laboratory of the University.

The laboratory was opened at Beaufort, N. C., on May 23, and it was occupied for research until September 15, or a little more than sixteen weeks. Its facilities were used by twelve investigators, and as the house which we have occupied for several years at Beaufort is too small to accommodate so large a party, I should have been forced to refuse to receive some of them if it had not fortunately happened that the only large house near the laboratory and suitable for our use was vacant this summer. I, therefore, rented it, with its furniture, for the use of our party, and as it furnished lodgings for several of us, and also enabled me to devote to scientific purposes the rooms in the laboratory which we have used in previous seasons as a kitchen and dining room, I found the necessary space for our party of twelve, although I was compelled to refuse three other applicants for lack of room.

The following is a list of the members of our party.

W. K. BROOKS, Ph. D., *Associate Professor of Morphology, J. H. U.—Director.*
E. A. Andrews, Ph. B., *Fellow, J. H. U.*
A. T. Bruce, A. B., *Fellow by Courtesy, J. H. U.*
G. B. Haldeman, A. B., *Graduate Student, J. H. U.*
J. C. Hemmeter, M. D., *Graduate Student, J. H. U.*
F. H. Herrick, A. B., *Graduate Student, J. H. U.*
W. H. Howell, Ph. D., *Associate, J. H. U.*
O. P. Jenkins, A. B., *Terre Haute, Ind.*
T. W. Mills, M. D., *Lecturer on Physiology, McGill University, Montreal.*
J. P. McMurrich, Ph. D., *Instructor, J. H. U.*
A. D. Morrell, *Chapel Hill, O.*
H. F. Nachtrieb, S. B., *Assistant Professor of Biology, University of Minnesota.*

I have been able this season to make important additions to a monograph on the Medusae of Beaufort, which has occupied me for the past five years, and which is now complete. Dr. McMurrich began this season the preparation of a similar monograph on the Anthozoa of Beaufort; and Mr. Andrews, who has been occupied for two years in the preparation of a similar history of the Annelids of Beaufort, has made numerous important

additions to his notes, and he has also obtained much valuable material for the study of the embryology of Annelids, upon which he is now at work in Baltimore. Professor Nachtrieb, who has been engaged for several years in a similar monographic study of the Echinoderms of Beaufort, continued this work during the season.

Two monographs on the fauna of Beaufort, one by Professor Conn, on the Crabs of Beaufort, and my own on Beaufort Medusae are now complete and ready for publication.

The members of our party also carried on researches on the embryology of the crustacea, the metamorphosis of macroura, the development of gasteropods, the propagation of the oyster, and many other subjects; and abstracts, giving an outline of the results of researches on the following topics, were published in the University Circular for October, 1885:—

The Metamorphosis of Limulus polyphemus, by Prof. H. L. Osborn, Purdue University, Indiana; Abstract of Researches on the Embryology of Limulus polyphemus, by W. K. Brooks and A. T. Bruce; Observations upon the Chemical Composition and Coagulation of the Blood of Limulus polyphemus, Callinectes hastatus, and Cucumaria, by W. H. Howell; On the presence of Haemoglobin in the Echinoderms, by W. H. Howell; On the Existence of a Post-Oral Band of Cilia in Gasteropod Veligers, by J. Playfair McMurrich; The Rhythm and Innervation of the Heart of the Sea Turtle, by T. Wesley Mills, Lecturer on Physiology, McGill University, Canada; On the Physiology of the Heart of the Alligator, by T. Wesley Mills; The Cardiac Rhythm of Fishes and the Action on the same of certain Drugs and Poisons, by T. Wesley Mills; On the Artificial Propagation and Cultivation of Oysters in Floats, by W. K. Brooks; Notes on the Stomatopoda, by W. K. Brooks; Notes on the Fishes of Beaufort Harbor, N. C., by O. P. Jenkins.

One of the most important and interesting of our studies is the work which has been carried on for several seasons on the natural history of Limulus. In 1884, Mr. Osborn discovered that the eggs of Limulus can be fertilized artificially, and that there is no difficulty in thus obtaining an abundant supply of the early stages. From the eggs which were thus fertilized Mr. Osborn reared a number of larvae, from which he made a series of valuable drawings of the external features. This summer Mr. Bruce and I have continued the study and have obtained a very complete history of the development of Limulus, an abstract of which appeared in the University Circular, No. 43, October, 1885. The most interesting result of this study is the evidence which it furnishes to show that the embryonic history of Limulus exhibits the most striking similarity to that of the ordinary Arachnida. A week after the publication of this abstract our library received the current number of the Quarterly Journal of Microscopical Science, in which there is an illustrated paper on the embryology of Limulus, by Mr. Kingsley, of Salem, Mass., who has reached a similar conclusion. Dr. Howell devoted a part of the season to the study of the blood of Limulus, Mr. Jenkins studied the histology of its digestive tract, and Mr. Wilson its nervous system, and the results of their investigations are either ready for publication or well advanced.

Within the last two months, the second of Mr. Wm. Bateson's papers on Balanoglossus, giving the results of his researches at Beaufort in 1884, has been published in the Quarterly Journal of Microscopical Science, and it is of especial interest, as he gives many very convincing reasons for believing that Balanoglossus, a very lowly organized and simple worm-like organism, is a vertebrate, and by far the most primitive member of this group.

I was occupied for the whole of last winter in preparing from my notes, made at the marine laboratory, an illustrated paper on the origin of alternation of generations in the Hydro-Medusae. This paper, with eight quarto plates, is now in press, and it will soon appear in the Memoirs of the Boston Society of Natural History. Several minor papers on various subjects are also now ready for publication, and some of them are to appear in the next number of the Studies from the Biological Laboratory.

Through the combined efforts of several of the members of our party, a paper giving a list of the animals which occur at Beaufort, with short notes as to their localities, habits, spawning season, development, etc., is now in preparation, and it is to be published this winter in the "Studies."

I was able during the past season to make a few observations upon the Stomatopoda which occur at Beaufort, and they are embodied in my report on the Stomatopoda collected by the Challenger Expedition, which will be ready for the press in a few days. It is to form part of the series of illustrated quarto volumes on the "Scientific Results of the Challenger Expedition," now in course of publication by the British Government.

Respectfully,

W. K. Brooks,
Director, Marine Laboratory.

Baltimore, *November*, 1885.

F.

Proceedings of University Societies.

The several scientific associations, composed of members of the faculty and advanced students, have met for the presentation and discussion of original papers as below stated.

1. The Scientific Association, under the presidency of Professor Martin, has had seven meetings. Papers have been read by: —

W. K. Brooks, on a new theory of variation; methods for producing illustrations for scientific papers.
H. Crew, an account of Juincke's experiments on hydrostatic pressure in a magnetic field.
H. H. Donaldson, the change of color in Anolis; the temperature sense.
J. R. Duggan, the relation of antiseptic power to chemical constitution.
G. S. Hall, on recent experiments on the sense of rhythm; on the question, is scientific psychic research practicable?
C. W. Hayes, on new forms of laboratory apparatus.
J. Jastrow, a comparison of sight and touch.
H. N. Martin, on a certain visual phenomenon not hitherto described.
P. Morrill, on methods of measuring atmospheric electricity.

H. N. Morse, on a simple apparatus that enables students to determine the equivalents of some of the elements.
J. P. McMurrich, the theory of the vertebrate skull.
S. Newcomb, the possibility of applying mathematics to political economy.
C. A. Perkins, on the seat of electromotive force in the voltaic cell.
I. Remsen, on the measure of the attractive force exerted by isomeric and homologous molecules; on the recent discovery of thiophene.
H. A. Rowland, on Sir William Thomson's models to illustrate the theory of light.
G. M. Sternberg, on the question, why does one attack of many infectious diseases protect from a second?
W. E. Story, an account of some geometrical models recently purchased.
G. H. Williams, on the results of the most recent work on the metamorphic and crystalline rocks.

2. The Philological Association, under the presidency of Professor Gildersleeve has had eight meetings. Papers have been read by:—

C. Adler, on the etymology of elixir; note on the catalogue of the books of the Bible in the MS. of the "Teaching of the Twelve Apostles."
W. M. Arnolt, on some oracles in Herodotus.
M. Bloomfield, two etymological notes; the probable Sanskrit equivalent of the Greek particle ἄρ, ῥα; on a new group of Vedic words, belonging to the root *praç*.
J. W. Bright, an account of King Alfred's Anglo-Saxon version of the *de consolatione philosophiae* of Boethius.
A. M. Elliott, on a philological expedition to Canada.
A. Emerson, Petrarca's relations to the universities of his time.
A. L. Frothingham, the meaning of Baalim and Ashtaroth in the Old Testament.
W. E. Gates, some notes on the Elene and Cynewulf.
B. L. Gildersleeve, on Weil's view of the origin of the word "poet;" the final sentence in classic Greek prose.
J. R. Harris, the western readings of the New Testament; the Codex Martinianus of the New Testament.
P. Haupt, on a Eucharistic sermon by John Chrysostom preserved in Ethiopic.
A. H. Huizinga, the lessons of the Peloponnesian War as developed in the speeches of Thucydides.
M. D. Learned, the English element in Pennsylvania German.
C. D. Morris, some account of Belock's speculation on the financial history of Athens.
E. M. Pease, the relative value of the MSS. of Terence, collated by Umpfenbach.
E. H. Spieker, the dialects of North Germany.
M. Warren, the etymology of hybrid; some old glosses in Codex Sangallensis 912.
H. Wood, the persistence of alliteration in English.

3. The Mathematical Society, under the presidency of Professor Newcomb, has had three meetings. Papers have been read by:—

F. Cajöri, on a quadratic form.
F. Franklin, the discriminant of the equation which determines the axes of a quadric surface.
A. S. Hathaway, the division of irrational algebraic quantity by real primes.
J. F. McCulloch, on the theorem, "every equation has a root."
W. E. Story, on generalized quantity; on the development of rational fraction in partial fractions.
C. Veneziani, on the extension of Rolle's theorem to non-uniform algebraic functions; on the geodesic line.

4. The Historical and Political Science Association, under the direction of Dr. H. B. Adams, has held frequent meetings. Among the papers read were the following:—

H. B. Adams, on the American historical association; the progress of civil service reform in the United States; principles of graduate and undergraduate work in history and politics; the historical tripos at the University of Cambridge.

F. A. Bancroft, on the negro in Mississippi politics.
L. Bonsal, on the question, what became of the northern slaves?
J. R. Brackett, on the slaveholders' convention at Annapolis in 1841; on the free negroes in Maryland.
J. Bryce, on the doctrine of laissez-faire (letter).
D. R. Dewey, on Jevon's investigations in currency and finance; on American literature relating to money, credit, and banking (chapters from a "History of Economic Thought in America").
R. T. Ely, on Pullman, a social study; on contemporary socialism; on the & B. O. relief association; introduction to the study of administration.
E. A. Freeman, on the study of history at Oxford (letter).
E. R. L. Gould, on the House of Lords; on Canadian studies in local history.
F. H. Hodder, on the city government of Chicago.
W. P. Holcomb, on Pennsylvania boroughs.
E. J. James, on the study of political science in American colleges.
J. F. Jameson, on the study of the constitutional and political history of the individual states; on the state constitutions of the revolutionary period; on the reception of the Massachusetts constitution of 1780 by the towns.
C. H. Levermore, on the history of witchcraft in Connecticut; on the colony at Saybrook, Connecticut; on judicial procedure in the early New Haven courts.
D. R. Randall, on the puritan colony at Annapolis.
J. C. Rose, on the city government of Baltimore.
D. W. Ross, on the methods of studying history in the college and in the university.
S. Sato, on the land laws of the United States.
W. B. Scaife, on boundary disputes between Pennsylvania and Maryland.
E. Schuyler, on the foreign relations of the United States.
A. Scott, on the New Jersey proprietors.
A. Shaw, on the Northwest as a field for original studies.
C. H. Shinn, on the land laws of mining districts.
W. Wilson, on the House of Representatives, revenue and supply (chapter from "Congressional Government"); on recent American economists (chapters from a "History of Economic Thought in America").
T. K. Worthington, on Pennsylvania state finance and taxation; village communities on the Delaware.

5. The Metaphysical Club, under the direction of Professor Hall, has had four meetings. Communications were presented by:—

A. T. Bruce, on final causes.
H. H. Donaldson, on visual localization and the sensation of heat; on the newly discovered organs of the heat sense.
A. H. Gross, on the psychology of reading; on the introspective method.
G. S. Hall, reviews of Meynert's *Psychiatrie*, Radestock's *Genie u. Wahnsinn*, and Sully's *Psychology;* reviews of recent psychophysic studies.
J. Jastrow, on a series of books on ultra-longevity; demonstration of logical machines.
C. H. Levermore, an educational study; the boy in education.
G. S. Morris, on Kapp's *Grundriss einer Philosophie der Technik* and on Du Prel's *Philosophie der Mystik;* on the method of philosophy.
J. C. C. Newton, on a case of contagious frenzy.
W. Noyes, Jr., on local facilities for the study of mental diseases.
C. S. Pierce, on *The Magnet*, a fourteenth century manuscript of Petrus Peregrinus.
G. E. de Steigeur, on a case of visualized number forms.
M. I. Swift, on final causes.

6. The Archæological Society, of which Dr. A. L. Frothingham, Jr. is secretary, has held several meetings. Among the papers presented were the following:—

M. Cohen, on Col. M. I. Cohen, and his collection of Egyptian antiquities, lately acquired by the University.

A. Emerson, on Greek and Etruscan vases.
C. C. Hall, on the Great Seal of Maryland.
A. M. Wilcox on the American school of archæology at Athens.

During the past session, there has been a series of loan exhibitions, under the direction of the Archæological Society, of works of art generously contributed by Mr. A. L. Frothingham, as follows:

November 22, 29, December 6.—Original drawings by old masters of the Italian schools, XVI to XVIII centuries.
December 13, 20.—Photographs of Italian sculpture and painting of the XV century.
January 10, 17.—Photographs of Italian sculpture and painting of the XIV and XVI centuries.
January 24, 31.—Engravings of Italian, French, German and British schools of the XVIII and XIX centuries.
February 7, 14.—Line engravings of portraits of all schools from the XVI to the XIX century (Italian, French, German, Flemish, Dutch and British.)
February 21, 28.—Etchings of Italian schools from the XVI to the XIX century.
March 7, 14.—Etchings of Dutch, German, Flemish and French schools.
March 28, April 4.—Line engravings of Italian schools from the XV to the XVIII century.
April 11, 18, 25.—Line engravings of German, Dutch, Flemish, French and British schools from the XVI to the XVIII century.
May 2, 9, 16.—Original drawings by old masters of the Italian, French and Dutch schools.

The permanent exhibition consisted of fragments of antique sculpture, Etruscan and Italo-Greek vases, and Egyptian statuettes from the Cohen Collection.

7. The Baltimore Naturalists' Field Club, under the presidency of Dr. G. H. Williams, has held seven meetings during the past year. At these meetings, reports were given by various members upon observations made in some of the three departments of the club devoted respectively to Geology and Mineralogy, Zoology, and Botany. Abstracts of these papers and of other more informal communications may be found in the University Circulars, Nos. 35, 38, and 41.

G.

List of Correspondents.

During the past year the Publication Agency of the Johns Hopkins University has received, in exchange with the journals here published, the scientific and literary publications of the institutions named below. A full list of the periodicals on file in the University library (including the journals, etc., received in exchange) is given in University Circular, No. 42, September, 1885.

GERMANY AND AUSTRIA.

Berlin: Deutsche chemische gesellschaft.
K. Preuss. akademie der wissenschaften.
Cassel: Verein für naturkunde.
Cracow: Académie des sciences.
Dresden: Naturwissenschaftliche gesellschaft Isis.
Erlangen: Seminarium philologicum.
Frankfort a. M.: Senckenbergische naturforschende gesellschaft.

Frankfort a. O.: Naturwissenschaftliche verein.
Freiburg i. B.: Naturforschende gesellschaft.
Göttingen: K. gesellschaft der wissenschaften.
Hamburg: Naturhistorisches museum.
Mathematische gesellschaft.
Wissenschaftliche anstalten.
Hannover: Historische verein für niedersachsen.
Heidelberg: Naturhistor-medicinische verein.
University.
Hermannstadt: Verein für naturwissenschaften.
Innsbruck: Institut für Oesterreich. geschichtsforschung.
Kiel: University.
Observatory.
Leipsic: Astronomische gesellschaft.
K. Sächsische gesellschaft der wissenschaften.
Mainz: Mittel-rheinische fabrikanten-verein.
Munich: K. Bayerische akademie der wissenschaften.
Gesellschaft für anthropologie, etc.
Görres-gesellschaft.
Prague: K. Böhmische gesellschaft der wissenschaften.
Verein für geschichte der Deutschen in Böhmen.
Stuttgart: Verein für vaterlandisch-naturkunde.
Trieste: Museo civico di storia naturale.
Vienna: Gesellschaft für bildende künste.
K. k. akademie der wissenschaften.
K. k. geologische reichsanstalt.
K.-k. Oest. museum für kunst und industrie.
Ornithologische verein.
Zool. inst. der universität.
Wiesbaden: Nassauische verein für naturkunde.
Würzburg: Medicinische facultät.
Zool. zootomische institut.

France and Switzerland.

Avranches: Société d'archéologie.
Berne: Schweiz. gesellsch. für d. gesammten wissenschaften.
Caen: Académie des sciences, arts et belles-lettres.
Société des pharmaciens du Calvados.
Cherbourg: Société nationale des sciences nat. et math.
Paris: Institut de France: académie des sciences.
Association française pour l'avancement des sciences.
Assoc. pour l'encouragement des études grecques.
Bureau des longitudes.
École centrale des arts et manufactures.
École des chartes.
École normale supérieure.
École polytechnique.
Faculté des sciences à la Sorbonne.
Ligue française de l'enseignement.
Ministère de l'instruction publique.
Observatoire.
Société chimique.
Société de l'enseignement supérieur.
Société de l'histoire du protestantisme français.
Société de legislation comparée.
Société française d'archéologie.
Société historique et cercle St. Simon.
Société mathématique de France.
Société nationale d'antiquaires de France.

Roscoff: Laboratoire d. zoologie expérimentale.
Toulouse: Académie des sciences.
Zurich: Société helvétique des sciences naturelles.

BELGIUM AND HOLLAND.

Amsterdam: Royal academy of sciences.
Royal zoological society.
Brussels: R. académie des sciences de Belgique.
Musée royal d'histoire naturelle.
Société royale malacologique de Belgique.
Observatoire royale.
Delft: École polytechnique.
Harlem: Musée Teyler.
Société Hollandaise des sciences.
Leyden: Nederland. dierkundige verein.
Liège: Société royale des sciences.

ITALY.

Bologna: R. deputazione di storia patria.
Società medica-chirurgica.
Brescia: Ateneo di Brescia.
Como: Società storica per la provincia di Como.
Florence: Società entomologica Italiana.
Genoa: Società di letture.
Milan: Istituto Lombardo di scienze e lettere.
R. accademia di belle arti.
Naples: R. academia delle scienze fisiche e. mathematiche.
Società di storia patria.
Zoölogical station.
Padua: Società Veneto-trentina di scienze naturali.
Palermo: Circolo matematico.
Società Siciliana per la storia patria.
Rome: Commissione archeologica comunale.
R. accademia dei Lincei.
R. comitato geologico d'Italia.
Department of foreign affairs.
Società geografica Italiana.
Società Romana di storia patria.
Turin: Observatoire della università.
R. accademia delle scienze.
Venice: R. istituto Veneto.
R. deputazione Veneto s. g. s. di storia patria.

SPAIN AND PORTUGAL.

Barcelona: Associació d'excursións Catalana.
Lisbon: Academia real das sciencias.
Sociedade da geografia.
Madrid: R. academia de la historia.
Observatorio astronomico.
San Fernando: Instituto y observatorio de marina.

DENMARK, SWEDEN AND NORWAY.

Bergen: Museum.
Christiania: University.
Commission der gradmessung.
Société des sciences.
Copenhagen: Royal academy of sciences.

Stockholm: Hogskola.
Geologiska forening.
Physiologische laboratorium.
K. Svenska vetenskaps akademie.
K. historische antiquitets akademie.

Russia and Finland.

Charkow: Mathematical society.
Dorpat: Naturforscher gesellschaft.
Helsingfors: Societa scientiarum fennica.
Moscow: Société impériale des naturalistes.
St. Petersburg: Académie impériale des sciences.
Russian archæological society.
Russian chemical society.

Great Britain and Ireland.

Birmingham: Philosophical society.
Cambridge: Antiquarian society.
Philological society.
Philosophical society.
Dublin: Royal Dublin society.
Royal Irish academy.
University press.
Edinburgh: Royal physical society.
Royal society.
Glasgow: Philosophical society.
Observatory of the university.
Greenwich: Royal observatory.
London: Chemical society.
Conchological society.
Crystallogical society.
Geological society.
Institute of actuaries.
Mathematical society.
Mineralogical society of Great Britain and Ireland.
Palestine exploration fund.
Philological society.
Royal astronomical society.
Royal institution.
Royal microscopical society.
Royal society.
Science and art department (South Kensington).
Society of biblical archæology.
Society of chemical industry.
Society of telegraph engineers.
Statistical society.
Manchester: Literary and philosophical society.
Oxford: Historical society.

British East Indian Possessions.

Calcutta: Asiatic society of Bengal.
Colombo, Ceylon: Ceylon branch of royal Asiatic society.
Singapore: Strait's branch of the royal Asiatic society.

Africa.

Bone, Algeria: Académie d'Hippone.
Oran, Algeria: Société de géographie et d'archéologie.

JAPAN.

Tokio: Seismological society of Japan.
University: science department.
Yokohama: Asiatic society of Japan.

AUSTRALIA AND NEW ZEALAND.

Adelaide: Royal society of South Australia.
Sydney: Linnean society.
Royal society of New South Wales.
Wellington: New Zealand institute.
Colonial museum.
Geological survey.

MEXICO AND SOUTH AMERICA.

Cordoba (Arg. Rep.): Academia nacional de ciencias.
Mexico: Observatorio del Mexico.
Quito: Universidad de Quito.
Rio de Janeiro: Observatoire impériale.

DOMINION OF CANADA.

Halifax: Institute of natural science.
Montreal: Royal society of Canada.
Natural history society.
Ottawa: Geological and natural history survey.
Toronto: Canadian institute.

GREECE AND TURKEY.

Athens: Deutsch. archäolog. institut.
Constantinople: Hellenikos philologikos syllogos.

UNITED STATES.

American association for the advancement of science.
American historical association.
American institute of mining engineers.
American medical association.
American oriental society.
American philological association.
American social science association.
Association of engineering societies.
Albany: N. Y. state museum of natural history.
Annapolis: U. S. naval institute.
Baltimore: Maryland historical society.
Medical and chirurgical faculty of Md.
Peabody Institute.
Boston: American academy of arts and sciences.
Mass. historical society.
National association of wool manufacturers.
New England historic-genealogical society.
Public library.
Society of natural history.
Webster historical society.
Zoölogical society.
Cambridge, (Mass.): Harvard college observatory.
Harvard college library.
Museum of comparative zoölogy.
Chicago: Academy of sciences.

Cincinnati: Mechanics' institute.
Observatory.
Public library.
Society of natural history.
Concord: New Hampshire historical society.
Davenport (Iowa): Academy of natural sciences.
Denver: Colorado museum of geology, etc.
Scientific society.
Normal (Ill.): Illinois state laboratory of natural history.
Iowa City: Iowa state historical society.
Ithaca (N. Y.): Cornell university library.
Lincoln (Neb.): Nebraska historical society.
Lowell (Mass): Historical association.
Madison (Wis.): Washburn observatory.
Wisconsin historical society.
Minneapolis: Minnesota academy of natural sciences.
Minnesota natural history and geological survey.
New Haven: Connecticut academy of arts and sciences.
Newark: New Jersey historical society.
Newport (R. I.): Natural history society.
New York: Academy of sciences.
American chemical society.
American geographical society.
American institute of mining engineers.
American museum of natural history.
Columbia college, school of mines.
Linnæan society.
Microscopical society.
Military service institution.
Philadelphia: Academy of natural sciences.
American philosophical society.
College of physicians.
Franklin institute.
Library company.
Mercantile library.
Penna. historical society.
University of Pa., Wharton school.
Portland: Maine historical society.
Princeton (N. J.): Museum of geology and archæology.
Providence: Rhode Island historical society.
Public library.
Raleigh: North Carolina agricultural experiment station.
Richmond: Southern historical society.
Virginia historical society.
Salem (Mass.): Essex Institute.
Peabody academy of sciences.
San Francisco: California academy of sciences.
Technical society of the Pacific Coast.
Savannah: Georgia historical society.
Sedalia (Mo.): Natural history society.
St. Louis: Academy of sciences.
St. Paul: Minnesota historical society.
Topeka: Kansas state historical society.
Washburn college laboratory.
Troy (N. Y.): Rensselaer society of engineers.
Washington: Army medical museum.
Astronomical observatory.
Biological society.

Washington: Bureau of ethnology.
Coast and geodetic survey.
Corps of engineers.
Fish commission.
Geological survey.
Naval museum of hygiene.
National academy of sciences.
National museum.
Naval medical society.
Patent office.
Philosophical society.
Signal service.
Smithsonian institution.
Other government publications.
Worcester: American antiquarian society.

H.

Gifts to the Library from September 1, 1884, to September 1, 1885.

ABBOT, PREST. T. C. Michigan Agricultural Report. Lansing, 1884. O.
ADAMS, F. G. Kansas Historical Documents, 1862–82.
ALDEN, REV. E. K. The Missionary Herald. Boston, 1821–84. 64 vols. O.
ALDEN, E. & BRO. American Newspaper Catalogue for 1884. Q.
AZARIAS, BROTHER. Culture of the Spiritual Sense. New York, 1884. O.
BABCOCK, HON. J. Nevada Public Documents. Carson City, 1883. O.
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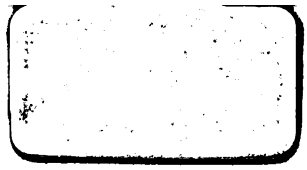

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